200
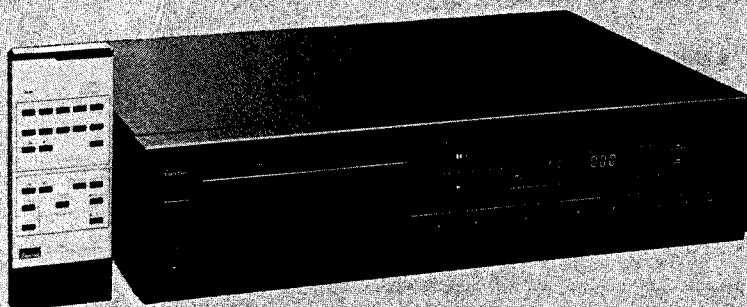
SERVICE MANUAL

COMPACT DISC PLAYER

SANSUI PC-V1000

CAUTION

1. Parts identified by the ⚠ symbol on the schematic diagram and the parts list are critical for safety. Use only replacement parts that have critical characteristics recommended by the manufacturer.
2. Make leakage-current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit before returning the appliance to the customer.

Sansui

SANSUI ELECTRIC CO., LTD.

•SPECIFICATIONS

Type	Compact disc digital audio system
Pickup	Semiconductor laser
Channels	2-channels
Frequency response	5~20,000 Hz
Dynamic range	More than 96 dB.
Harmonic distortion (1 kHz)	0.003% or less
Wow and Flutter	Below measurable limits
Output voltage	2V

Signal format
Sampling frequency .... 44.1 kHz
Quantization bit number
...... 16 bit linear
Transmission rate .... 4.3218 Mbit/sec

Compact disc
Playing time .... About 60 minutes
Dimensions .... Diameter 120 mm

Power requirements .... 120/220/240V 50/60 Hz
For U.S.A. and Canada
.... 120V (60 Hz)

Power consumption 50W

Dimensions
Compact disc player ... 430 mm (16-15/16")W
111.5 mm (4-3/8")H
297 mm (11-11/16")D
Remote control.......... 66 mm (2-5/8")W
23 mm (15/16")H
168 mm (6-5/8")D

Weight
Compact disc player ... 7.2 kg (15.9 lbs) net
Remote control......... 160g (0.35 lbs) net

* Design and specifications subject to changes without notice for improvements.

CAUTION

1. The symbols, UL, CSA, BS, UK, EU, AS and XX on the parts list and the schematic diagram mean followings respectively.

UL......................... Manufactured for U.S.A market.
(Underwriters Laboratories approved model.)
CSA..................... Manufactured for Canadian market.
SA........................ Manufactured for South African market.
BS, UK .... Manufactured for United Kingdom market.
EU .... Manufactured for European market.
AS........................ Manufactured for Australian market.
XX........................ Standard Version.
NON MARK .... Common Parts.

2. Some printed circuit boards are not supplied as the assembled. To separate these in this service manual, the stock No's are not indicated at the ends of the board names. However, the individual parts on the circuit boards are provided by orders.

3. Since some of capacitors and resistors are omitted from parts lists in this service manual, refer to the Common Parts List for capacitors & resistors, which was issued on February 1983.

4. Abbreviations in this service manual are as follows.

●Abbreviations List

C.R.	: Carbon Resistor	E.B.	: Bi-Polar Electrolytic Capacitor
S.R.	: Solid Resistor		
Ce.R.	: Cement Resistor	E.B.L.	: Low Leak Bi-Polar Electrolytic Capacitor
M.R.	: Metal Film Resistor		
F.R.	: Fusing Resistor	Ta.C.	: Tantalum Capacitor
N.I.R.	: Non-Inflammable Resistor	F.C.	: Film Capacitor
A.R.	: Array Resistor	M.P.	: Metalized Paper Capacitor
C.C.	: Ceramic Capacitor	P.C.	: Polystyrene Capacitor
C.T.	: Ceramic Capacitor, Temoerature Compensation	G.C.	: Gimmic Capacitor
		A.C.	: Array Capacitor
E.C.	: Electrolytic Capacitor	V.R.	: Variable Resistor
E.L.	: Low Leak Electrolytic Capacitor	S.V.R.	: Semi Variable Resistor
		SW.	: Switch

1. BLOCK DIAGRAM
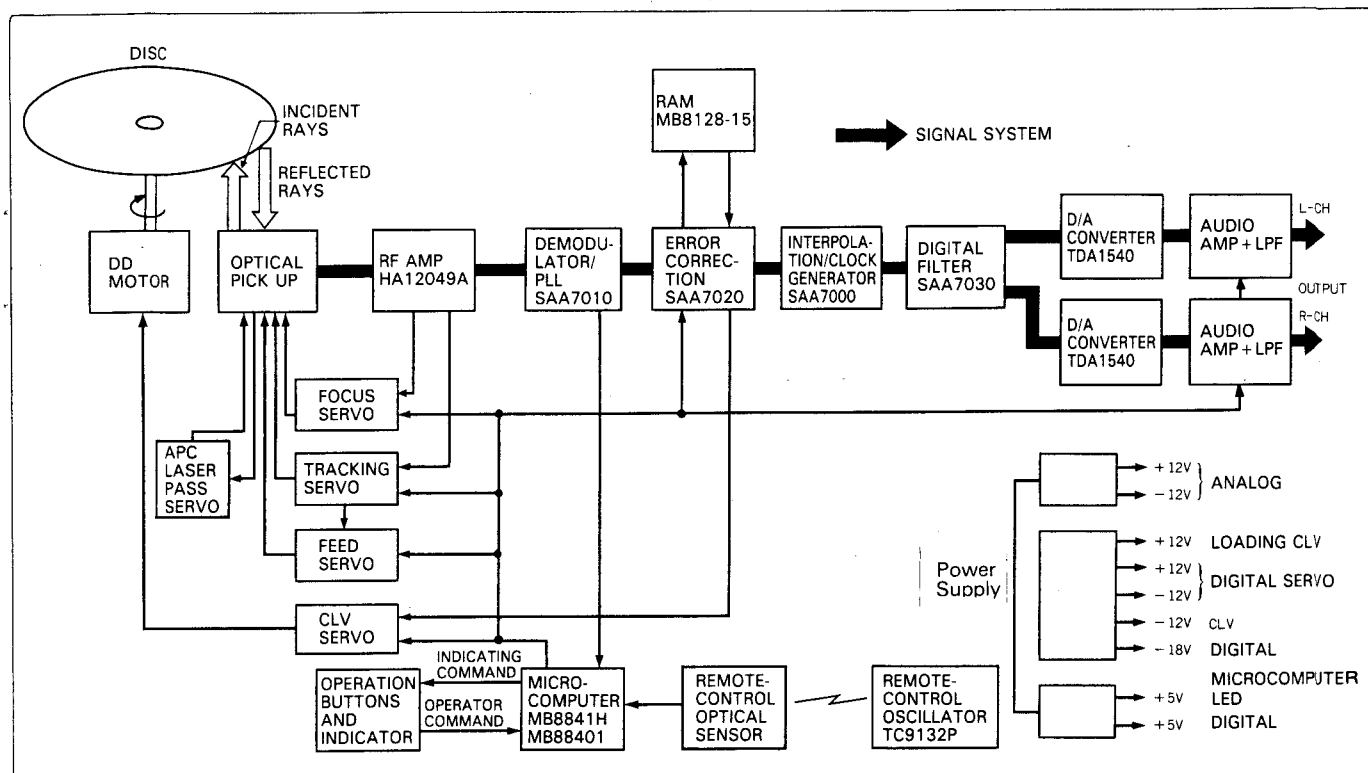
2. FUNCTIONS OF MAIN ICs

A. HA12049A (Input signal processing IC for CD)
* Four-divided photodiode output signal amplifier/adder
* AGC amplifier
* Signal waveform shaper with slice-level controller
* Three-beam tracking error detector
* Focus error detector
* Focus lock detector
* LASER power stabilizer

B. SAA7010 (Demodulator, PLL)
* EFM-modulated 14-bit PCM signals are returned to original 8-bit signals.
* PLL circuit produces 4.3-MHz CLOCK signals in synchronization with input signals.

C. MB88401, MB8841H (Microcomputers)
* Operation and indication controls
* Mechanism sensor control
* Signal processing in signal system

D. SAA7020 (Error correction)
* This IC corrects data sampling error as correctly as possible and feeds the correctly sampled data to the next stage SAA7000 together with timing signals.
* Non-corrected data are fed to the next error-recognized stage SAA7000.
* DD motor speed controlling signal is supplied.

E. MB8128-15 (RAM)
* Write and read of information necessary for error detection and error correction
* Revolution fluctuation absorption and data rearrangement

F. SAA7000 (Interpolation, clock generation)
* Harmful influence due to error information upon original signals is reduced. The error information results from misscorrection at the preceding stage SAA7020.

G. TDA1540 (D-A converter)
* 14-bit converter for converting PCM digital signals into analog signals.
* By the use of this D-A converter, it is possible to obtain a high S/N ratio and an excellent linearity as in 16-bits, in combination with the preceding stage digital filter.
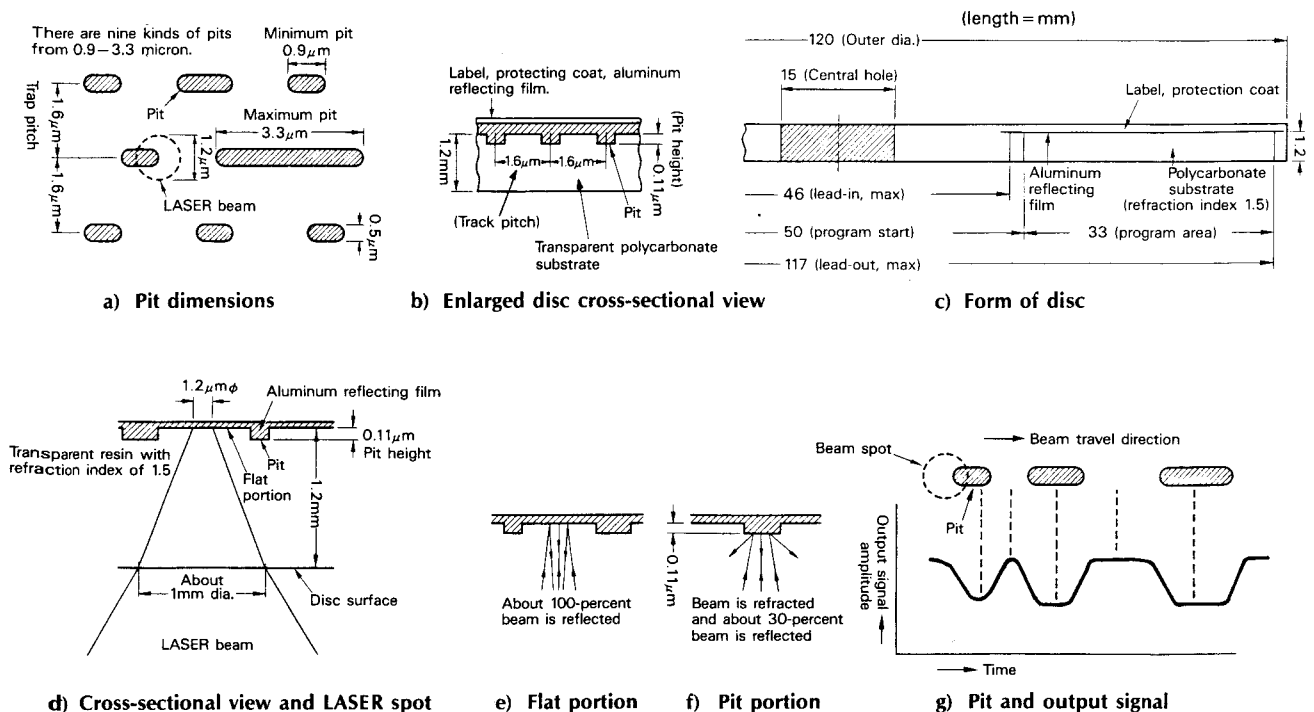
H. SAA7030 (Digital filter)
* After analog signals are reproduced through D-A converter, sampling frequency modulated signals (the fundamental harmonic is modulated by the sampling frequency) and higher harmonic are included in the fundamental harmonic.
The higher-order harmonic cannot be eliminated by a low-pass filter through which 20 kHz or more frequency components are cut off. Therefore, a digital filter system has been adopted. A signal with a frequency of 44.1 kHz is frequency-converted into another signal with a frequency of 176.4 kHz (4 times). By this, no modulated wave is included within the fundamental harmonics of 176.4 kHz ± 20 kHz and 20 kHz. Additionally, a low-pass filter through which 30 kHz or more frequency components are cut off is used for preventing higher-order harmonics from being generated within audible range of 20 kHz or less.

3. OPERATION PRINCIPLE OF COMPACT DISC PLAYER

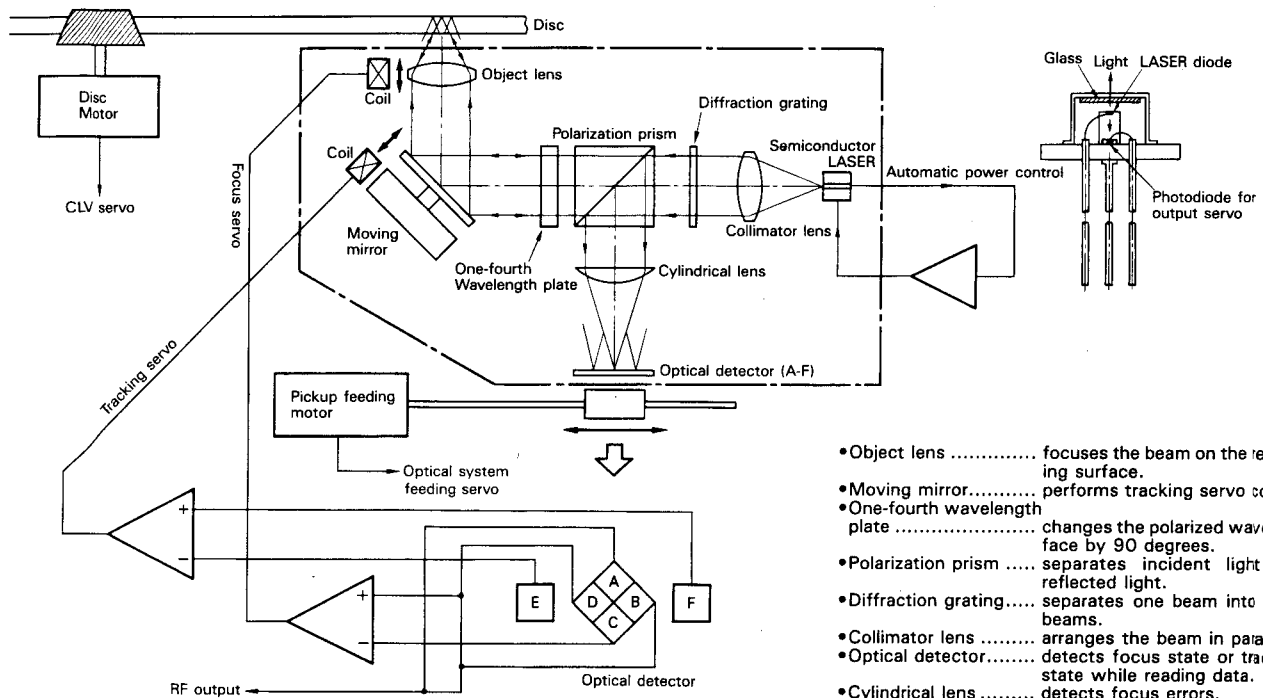## 3-1. Comparison of Compact Disc Player and Conventional Disc Player

Compact Disc		Conventional Disc (30 cm disc)
Transparent resin disc with a signal surface of aluminum reflecting film	Disc structure	Black resin disc
12 cm	Dia.	30 cm
1.2 mm	Thickness	About 1.8 mm
About 15 gram	Weight	About 120 gram
LASER beam from inner to outer circumference	Pickup travel direction	Stylus from outer to inner circumferences
About 500 rpm near inner circumference, about 200 rpm near outer circumference (constant linear velocity: 1.2 — 1.4 m/sec.)	Revolution speed	33-1/3 rpm (Constant revolution speed)
Digital signals are recorded on presence or absence of a series of fine hollows (See fig a))	Music signals recorded on disc	Music vibrations are directly recorded on continuous zigzag lines of a V-shaped groove
1.6 micron	Pitch (Width between two adjacent signals)	About 60 — 200 micron (variable pitches according to vibration magnitude)
One surface	Recording surface	Both surfaces
Ordinally one hour (2ch stereo), 78 min. at maximum	Recording time period	Ordinally one hour (both surfaces) (2ch stereo)
LASER beam is allowed to be incident to the lower surface of a disc, transmitting through a transparent resin body, being reflected from a signal surface of reflecting film. The beam reflected by and transmitted from resin body is sensed in dependence upon fluctuations in magnitude of beam caused by presence or absence of a series of fine hollows.	Reproductions of recorded signals	A pickup stylus vibrates in a groove. Vibrations are sensed with a pickup cartridge as electrical music signals.
Fluctuations in magnitude of beam are sensed as digital signals. After being D-A converted (incorporated in a player), these signals are amplified to actuate a speaker.	Processing of sensed signals	Signals outputted from a cartridge are directly amplified to actuate a speaker.
Signals indicative of music numbers, music playing time intervals, etc. are included in recorded music signals in order to enable selection of music start, automatic music selecting program or indication of music playing time periods. Additionally, information signals indicative of music contents are recorded at the innermost circumference (lead-in portion), by which various interesting functions are synthetically enabled corresponding to the type of players.	Music discrimination or other	Musics recorded on a disc can be selected by eyesight on the basis of lead-over grooves between two modulated grooves. A stylus can be put onto any desired lead-over groove. Playing time periods are usually recorded on a disc label or record jacket.

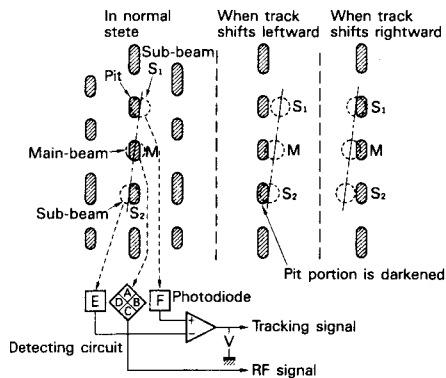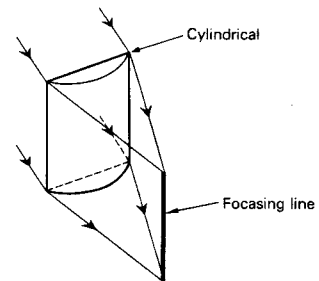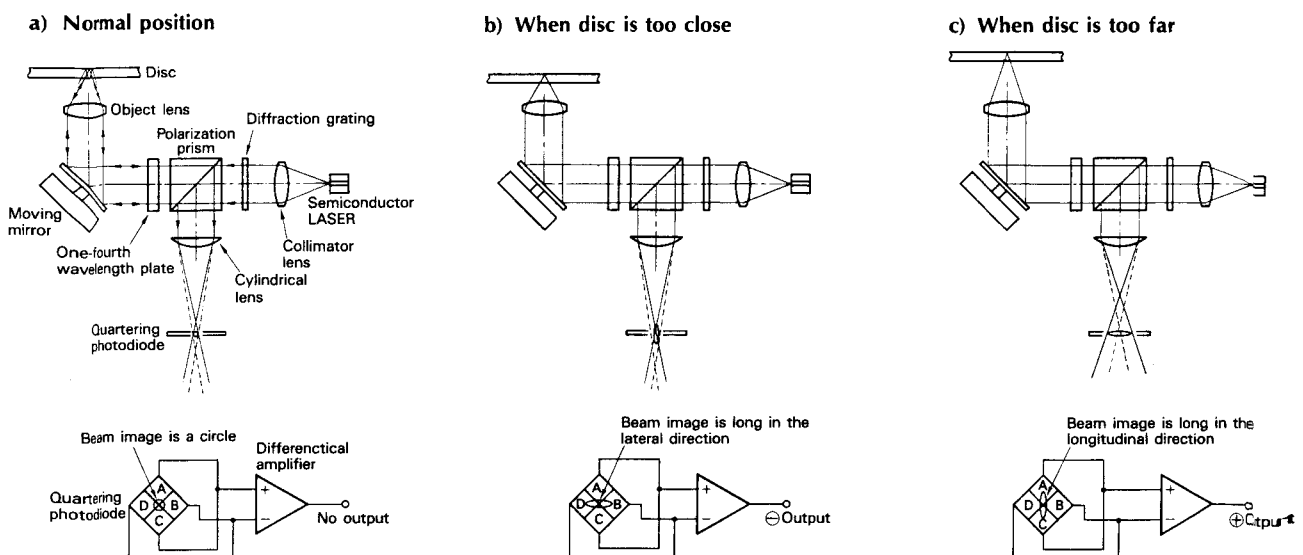## 3-2. Disc Structure and LASER Beam Reflection

a) Pit dimensions

b) Enlarged disc cross-sectional view

c) Form of disc

d) Cross-sectional view and LASER spot

e) Flat portion   f) Pit portion

g) Pit and output signal

3-3. Optical System and Servo Mechanism

Labels in diagram: Disc, Disc Motor, CLV servo, Focus servo, Tracking servo, Object lens, Coil, Diffraction grating, Polarization prism, Semiconductor LASER, Automatic power control, Glass Light LASER diode, Photodiode for output servo, Coil, Moving mirror, One-fourth Wavelength plate, Cylindrical lens, Collimator lens, Optical detector (A-F), Pickup feeding motor, Optical system feeding servo, RF output, Optical detector, E D B F, A C

- Object lens .... focuses the beam on the reflecting surface.
- Moving mirror........... performs tracking servo control
- One-fourth wavelength plate .... changes the polarized wave surface by 90 degrees.
- Polarization prism ..... separates incident light and reflected light.
- Diffraction grating..... separates one beam into three beams.
- Collimator lens .... arranges the beam in parallel.
- Optical detector........ detects focus state or tracking state while reading data.
- Cylindrical lens .... detects focus errors.

3-4. Three-beam tracking detection method

In normal state / When track shifts leftward / When track shifts rightward

Sub-beam S1, Pit, Main-beam M, Sub-beam S2, Pit portion is darkened, E A D B C F Photodiode, Tracking signal, Detecting circuit, RF signal

<Focusing line of cylindrical lens>

Cylindrical, Focasing line

3-5. Focus detection on astigmatism method

a) Normal position

Disc, Object lens, Diffraction grating, Polarization prism, Semiconductor LASER, Collimator lens, Moving mirror, One-fourth wavelength plate, Cylindrical lens, Quartering photodiode

Beam image is a circle, Differenctical amplifier, Quartering photodiode, A B D C, No output

b) When disc is too close

Beam image is long in the lateral direction, A B D C, ⊖Output

c) When disc is too far

Beam image is long in the longitudinal direction, A B D C, ⊕Output

4

3-6. Principle of PCM

Pulse code Modulation system is adopted in the compact disk. The PCM system is superior in improvement of frequency band, S/N, non-linearlity, and time fluctuations.

Sampling ..... In PCM system, sampling values are read from time-series original signals at appropriate time intervals and coded by the combinations of two pulses (0 and 1). The sampling frequency is 44.1 kHz.

Quantization ..... When the original signals are sampled, finite values can be obtained. However, since these values cannot indicate the magnitude of amplitude, the sampled values are divided into finite amplitude segments. Quantization is to code these amplitude segments. (Quantization bits are sixteen)

PM......... Phase Modulation
PAM....... Pulse Amplitude Modulation
PPM....... Pulse Position Modulation
PWM ..... Pulse Width Modulation
PNM ...... Pulse Number Modulation

< Kinds of modula system >

Carrier

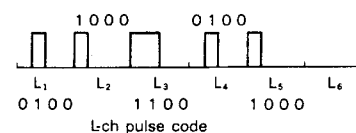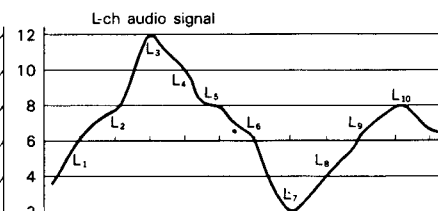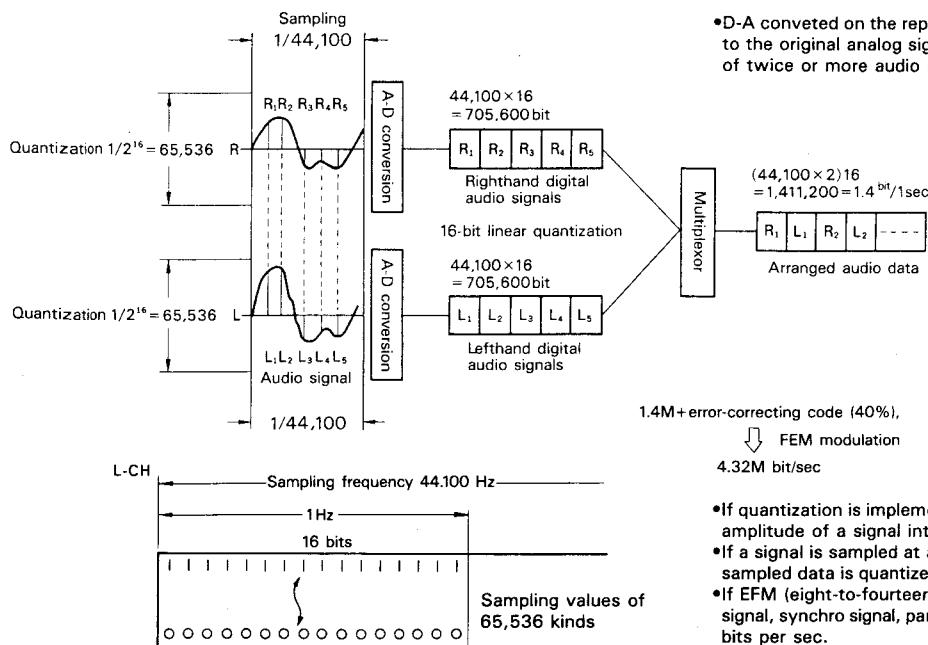Original analog signal

AM

PM

FM

Original analog signal

PAM

PPM

PWM

PNM

PCM
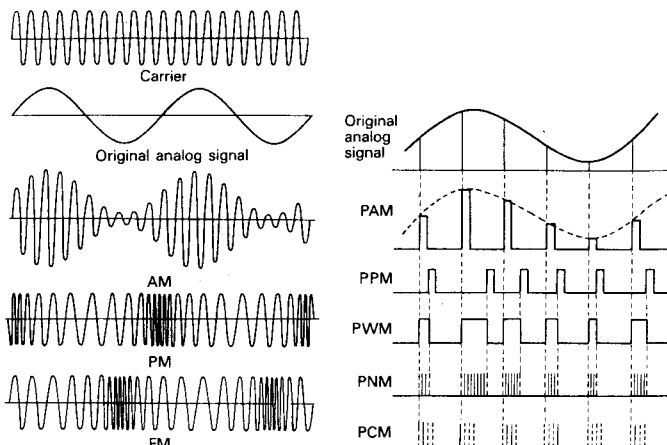
Continuous wave parameter modulation

Pulse parameter modulation

< Principle of PCM >

Dicimal notation	Binary notation			
15	1	1	1	1
14	1	1	1	0
13	1	1	0	1
12	1	1	0	0
11	1	0	1	1
10	1	0	1	0
9	1	0	0	1
8	1	0	0	0
7	0	1	1	1
6	0	1	1	0
5	0	1	0	1
4	0	1	0	0
3	0	0	1	1
2	0	0	1	0
1	0	0	0	1
0	0	0	0	0

L-ch audio signal

1 0 0 0   0 1 0 0

L_1 L_2 L_3 L_4 L_5 L_6
0 1 0 0   1 1 0 0   1 0 0 0
L-ch pulse code

A-D convension

R-ch audio signal

R-ch pulse code
0 1 0 0   0 1 0 0

R_1 R_2 R_3 R_4 R_5 R_6
0 1 1 0   0 0 1 0   1 0 0 0

Sampling 1/44,100

Quantization $1/2^{16} = 65,536$ R

$R_1 R_2 R_3 R_4 R_5$

A-D conversion

$44,100 \times 16 = 705,600$ bit

R_1 R_2 R_3 R_4 R_5
Righthand digital audio signals

16-bit linear quantization

$44,100 \times 16 = 705,600$ bit

L_1 L_2 L_3 L_4 L_5
Lefthand digital audio signals

Quantization $1/2^{16} = 65,536$ L

$L_1 L_2 L_3 L_4 L_5$
Audio signal

1/44,100

Multiplexor

$(44,100 \times 2)16 = 1,411,200 = 1.4$ bit/1sec

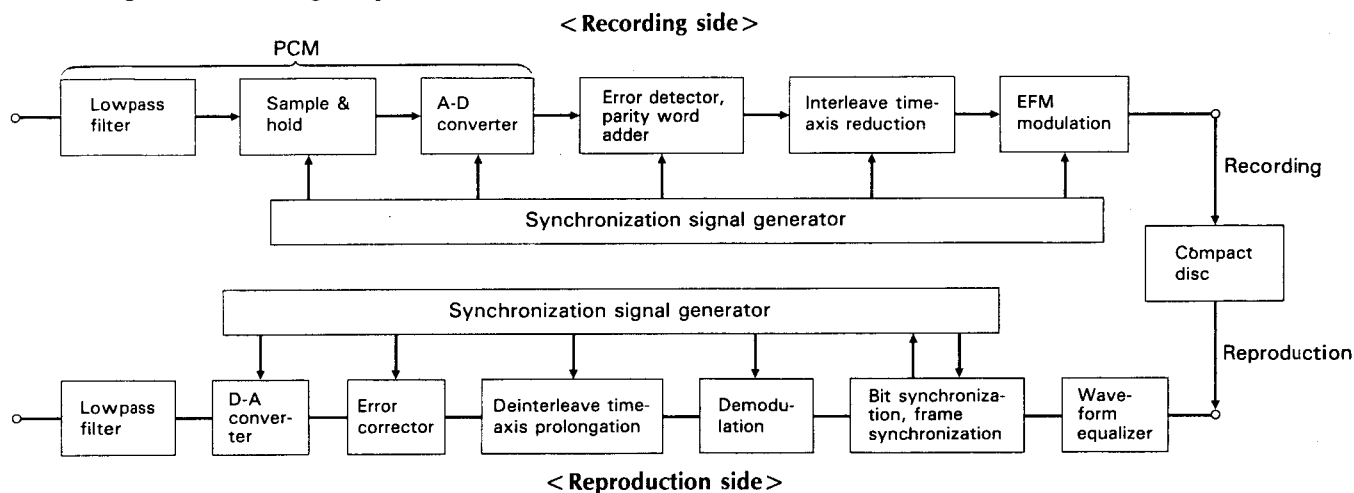R_1 L_1 R_2 L_2 ----
Arranged audio data

• D-A conveted on the reproduction side, sampled pulse signals are returned to the original analog signals completely. However, a sampling frequency of twice or more audio signals are necessary.

1.4M + error-correcting code (40%),
⇩ FEM modulation
4.32M bit/sec

• If quantization is implemented by use of 16 bits, it is possible to divide the amplitude of a signal into 65,536.
• If a signal is sampled at a sampling frequency of 44.1 kHz and further the sampled data is quantized by 16 bits, 1.4M bits can be obtained in stereo.
• If EFM (eight-to-fourteen modulation) is implemented by adding a control signal, synchro signal, parity word, etc. to 1.4 bits, the sum total is 4,3218M bits per sec.

L-CH

Sampling frequency 44.100 Hz

1 Hz

16 bits

Sampling values of 65,536 kinds

3-7. CD Signal Processing Step

<Recording side>

<Reproduction side>

### ●Circuit Functions

<Recording side>

●Lowpass filter................. Frequencies of 20 kHz more are eliminated to perfectly demodulate PCMed original signals.

●Sample and hold............ Original signals are sampled and held until the sampled signals are A-D converted.

●A-D converter................ Original sampled signals (analog signals) are converted to pulse code signals (digital signals).

●Error detector, parity word adder and interleave
.... Compact disc for recording PCMed signals are not subject to dust or stains. However, in case information signals are deficient due to cracks, it is impossible to reproduce the information signals. To overcome these problem, error-correcting codes are added or information signals are rearranged on the so-called interleave method.

●EFM modulation .... PCM method are of several systems in dependence upon how to select waveform corresponding to binary codes (1 or 0) of pulse data. The compact disc employs Eight-to-Fourteen Modulation system in which 8-bit pulses are converted into 14-bit pulses. This system is easy to correct error produced in reproducing information signals.

<Reproduction side>

●On this sound reproduction side, information signals recorded on a disc are reproduced through almost the reverse operation of the recording side.

●Lowpass filter................. Higher-frequency signals other than the original signals generated in PCM sampling are eliminated.
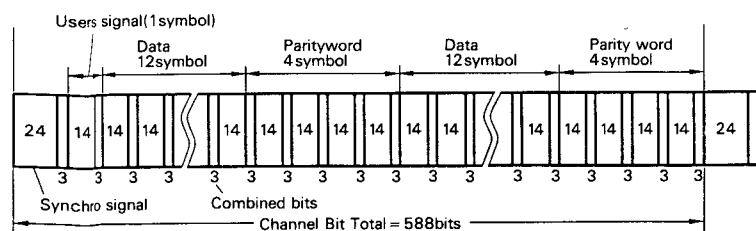
3-8. Recording Method on Disc
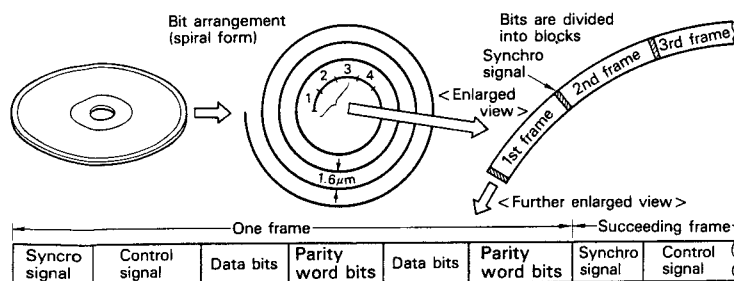
Contents of one frame

|	
Synchro signal	24-ch bits
Control signal (user's signal)	1 × 14-ch bits
Data signal	12 × 2 × 14-ch bits
Parity word signal	4 × 2 × 14-ch bits
Combined bits	34 × 3-ch bits
Total:	588-ch bits

●Channel bits (ch bits)
.... Bits converted from 8 bits to 14 bits by EMF modulation are called channel bits to distinguish them from the original data bits.
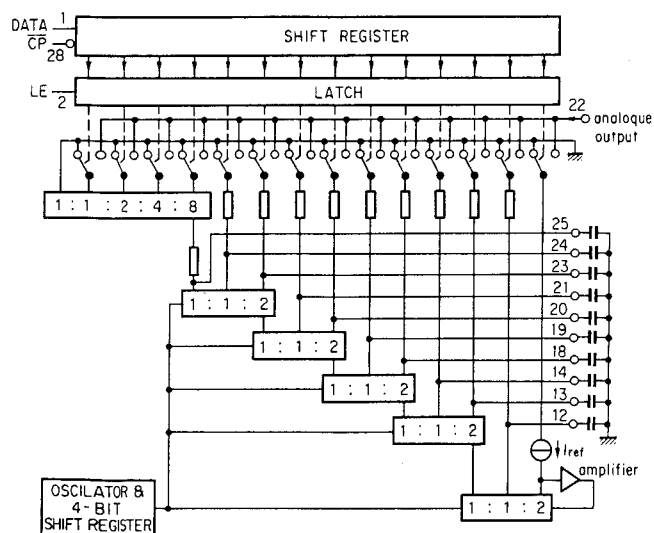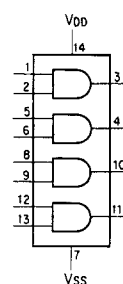
4. INTERIOR BLOCK DIAGRAM & TERMINAL FUNCTION OF IC
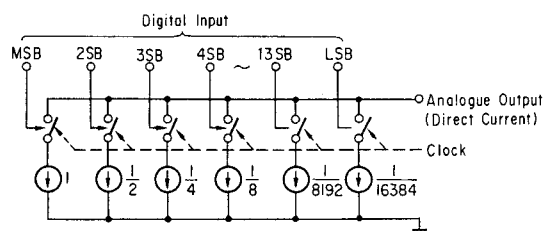
• HA12049 (Input Signal Process)
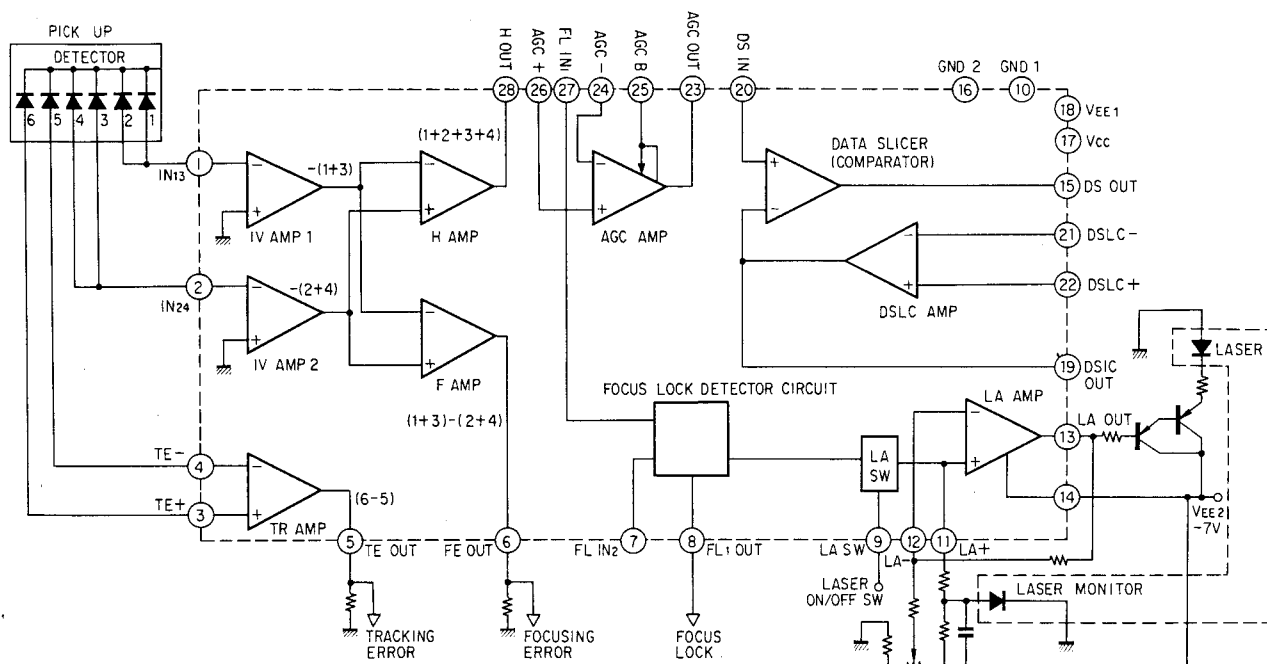
• TDA1540D (Digital-to-Analog Converter)
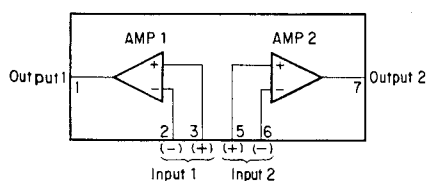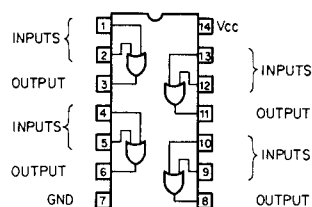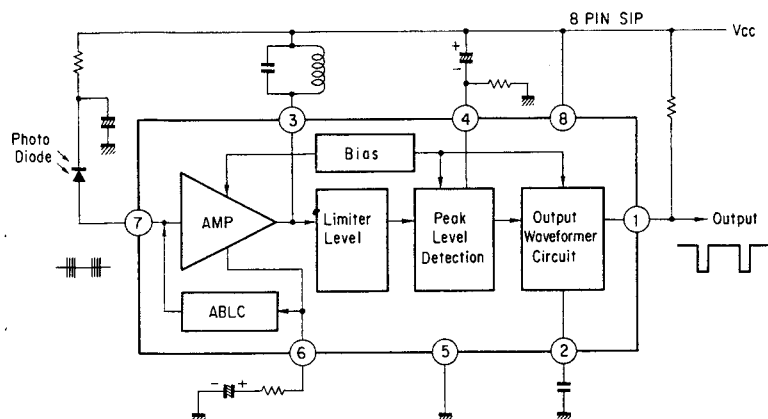

• TC4081BP (Quad And Gate)

• TDA1540D
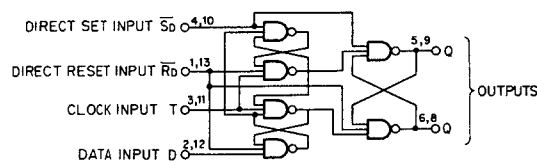

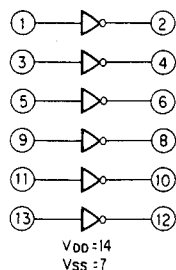
• M5218L (Dual Operation Amp)

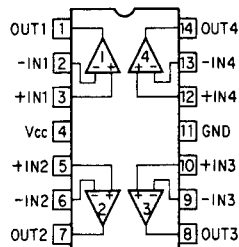• M74LS32P (Quad OR Gate)

•μPC1373H (Pre Amp of Remote Control)

8 PIN SIP

Vcc

Photo Diode

Bias

AMP

Limiter Level

Peak Level Detection

Output Waveformer Circuit

Output

ABLC

3 4 8

7

6 5 2

1

•M74LS74P (Each Flip-Flop)

DIRECT SET INPUT $\overline{S_D}$ o —4,10

DIRECT RESET INPUT $\overline{R_D}$ o —1,13

CLOCK INPUT T o —3,11

DATA INPUT D o —2,12

5,9 Q

6,8 $\overline{Q}$

OUTPUTS

•TC4090BP (Inverter)

① —▷○— ②
③ —▷○— ④
⑤ —▷○— ⑥
⑨ —▷○— ⑧
⑪ —▷○— ⑩
⑬ —▷○— ⑫

$V_{DD} = 14$
$V_{SS} = 7$

•MB3614 (Quad Operation Amp)

OUT1 [1]   [14] OUT4
−IN1 [2]   1   4   [13] −IN4
+IN1 [3]   [12] +IN4
Vcc [4]   [11] GND
+IN2 [5]   [10] +IN3
−IN2 [6]   2   3   [9] −IN3
OUT2 [7]   [8] OUT3

•MB84040B (12-bit Ripple-Carry Binary Counter)

$2^{12}-5$ $2^{12}-3$ $2^{12}-1$
$2^{12}-4$ $2^{12}-2$ 2^{12}

Clock
Reset   (=4.096)
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12

Q12 [1]   [16] V_{DD}
Q6 [2] Q12 Q11 [15] Q11
Q5 [3] Q6   [14] Q10
Q7 [4] Q5   Q10 [13] Q8
Q4 [5] Q7   Q8 [12] Q9
Q3 [6] Q4   Q9 [11] Reset
Q2 [7] Q3   R   [10] $\overline{Clock}$
V_{SS} [8] Q2 $\overline{CK}$ [9] Q1
           Q1
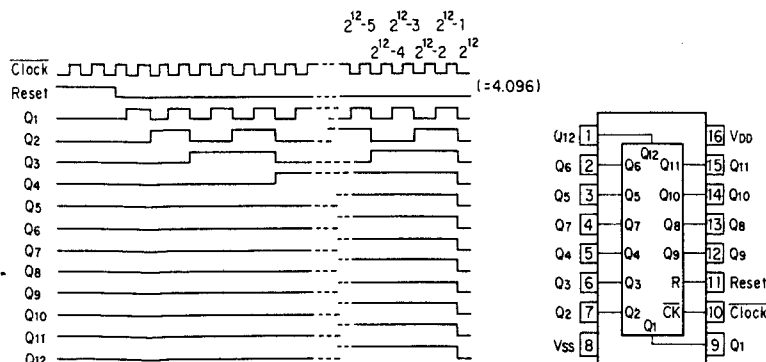
•TC4011RS (NAND1~4)/MSM4011 (NAND1~4)
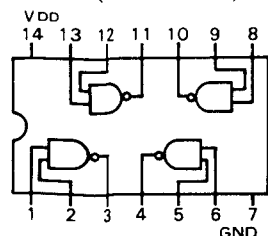
V_{DD}
14 13 12 11 10 9 8

1 2 3 4 5 6 7
GND

•TC40H004P (Hex Inverter)

V_{DD} 6A 6Y 5A 5Y 4A 4Y
[14] [13] [12] [11] [10] [9] [8]

[1] [2] [3] [4] [5] [6] [7]
1A 1Y 2A 2Y 3A 3Y V_{SS}

•MB84081B (Quad And Gate)

1A [1]   [14] V_{DD}
1B [2]   [13] 4A
1Y [3]   [12] 4B
2Y [4]   [11] 4Y
2B [5]   [10] 3Y
2A [6]   [9] 3B
V_{SS} [7]   [8] 3A

$Y = A \cdot B$

•MB840693 (Inverter)

1A [1]   [14] V_{DD}
1Y [2]   [13] 6A
2A [3]   [12] 6Y
2Y [4]   [11] 5A
3A [5]   [10] 5Y
3Y [6]   [9] 4A
V_{SS} [7]   [8] 4Y

$Y = \overline{A}$

•BA6109 (Motor Driver)

Vz1 Vout1 Vout2 Vcc2 Vz2
o3   o2   o10   o8   o9

Vcc1
7

V_R
4

GND
1

FIN o5

RIN o6

FIN	RIN	Vout 1	Vout 2	Input level
1	1	L	L	1 > 2.0V
0	1	L	H	0 < 0.7V
1	0	H	L	
0	0	L	L	
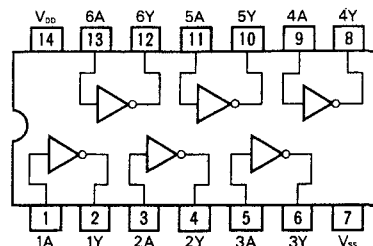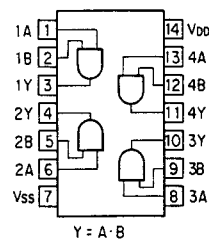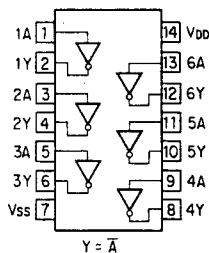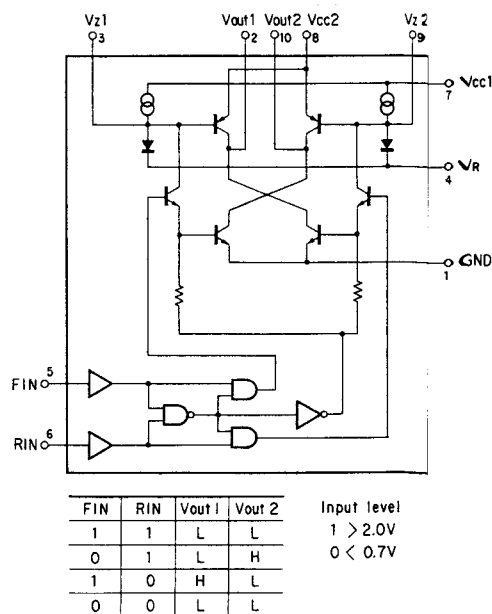
•TC4538BP (Resettable Monostable Multiviblator)
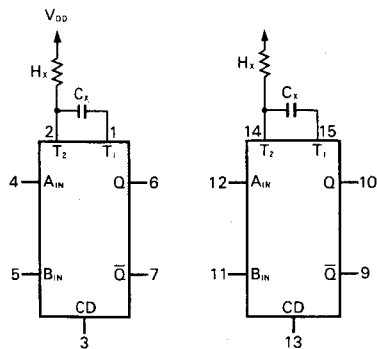
V_{DD} : 16, V_{SS} : 8

<TC4538P>

INPUT			OUTPUT		NOTE
A_{IN}	B_{IN}	CD	Q	$\overline{Q}$	
↑	H	H	⎍	⎍	OUTPUT ENABLE
↑	L	H	L	H	INHIBIT
H	↓	H	L	H	INHIBIT
L	↓	H	⎍	⎍	OUTPUT ENABLE
*	*	L	L	H	INHIBIT

* : Don't Care

•NJM4558D/NJM4559D (Operation Amp)

A−OUT 1
A−IN 2
A+IN 3
V− 4
V+ 8
B−OUT 7
B−IN 6
B+IN 5

•MB74LS74 (Flip-Flop)

2 CLR 2D 2CK 2PR 2Q 2Q̄
Vcc
14 13 12 11 10 9 8
1 2 3 4 5 6 7
CLR 1D 1CK 1PR 1Q 1Q̄ GND

<MB74LS74>
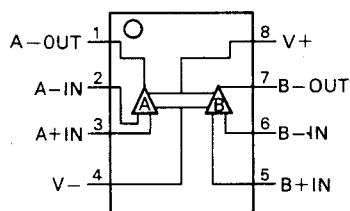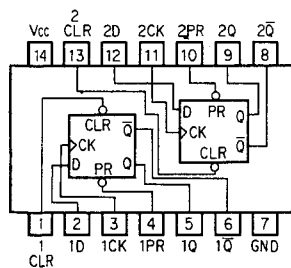
INPUT				OUTPUT	
PRESET	CLEAR	CLOCK	D	Q	$\overline{Q}$
L	H	×	×	H	L
H	L	×	×	L	H
L	L	×	×	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	×	Q_0	Q_0

•M74LS164P (8 bit Serial-In Parallel-Out Shift Resister)

OUTPUTS

SERIAL DATA INPUTS Ds1 (1), Ds2 (2)
CLOCK INPUT T (8)
DIRECT RESET INPUT Rd (9)

Q_0 (3), Q_1 (4), Q_2 (5), Q_3 (6), Q_4 (10), Q_5 (11), Q_6 (12), Q_7 (13), Vcc (14)

(7) GND

<M74LS164P>

CLEAR
Input { DS1, DS2 }
CLOCK
Output { Q_0, Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7 }
CLEAR   CLEAR
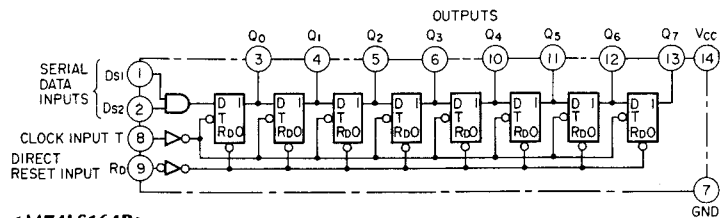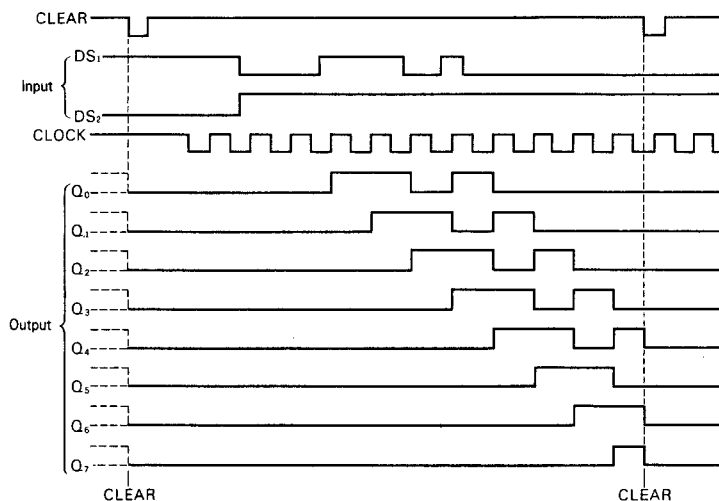
•MSN2128-15RS/MB8128-15 (RAM)

24 Vcc   12 GND

8 A0, 7 A1, 6 A2, 5 A3, 4 A4, 3 A5, 2 A6 — row Selecting — RAM

9~11 I/O1 — input data control
13~17 I/O8 — I/O circuit, row selecting
A7 1, A8 23, A9 22, A10 19

18 CS̄
21 WĒ
20 OĒ
Power down circuit

<MSN2128-15RS/MB8128-15>
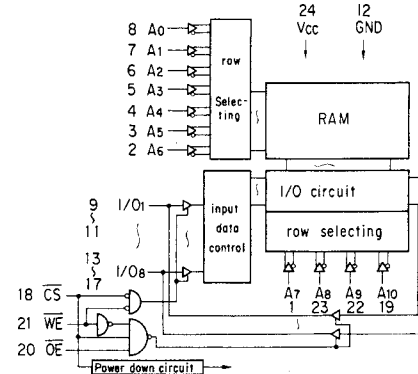
$\overline{CS}$	$\overline{WE}$	$\overline{OE}$	Operation Mode	Input/ Output	Comsumed Power
H	X	X	Non Selection	High Impedance	Stand-by
L	L	X	Write Mode	Input	Operation
L	H	L	Read Mode	Output	Operation
L	H	H	Output disable	High Impedance	Operation

H: high level   L: low level   X: Unrelated to "H" and "L"

•M74LS86P (EXOR Gate)
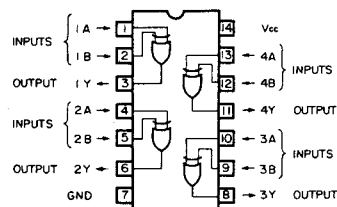
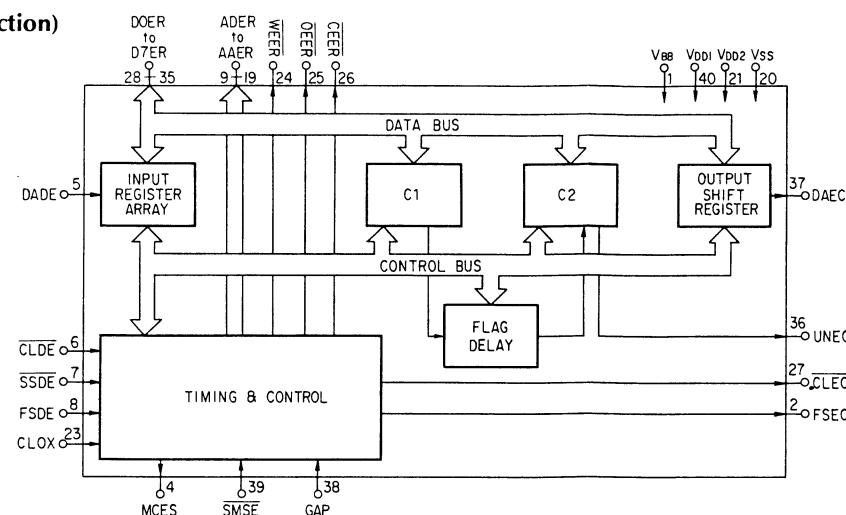INPUTS { 1A → 1, 1B → 2 }
OUTPUT 1Y ← 3
INPUTS { 2A → 4, 2B → 5 }
OUTPUT 2Y ← 6
GND 7
14 Vcc
13 ← 4A, 12 ← 4B } INPUTS
11 → 4Y OUTPUT
10 → 3A, 9 → 3B } INPUTS
8 → 3Y OUTPUT

•SAA7010 (Demodulator/PLL)

•SAA7020 (Error Correction)
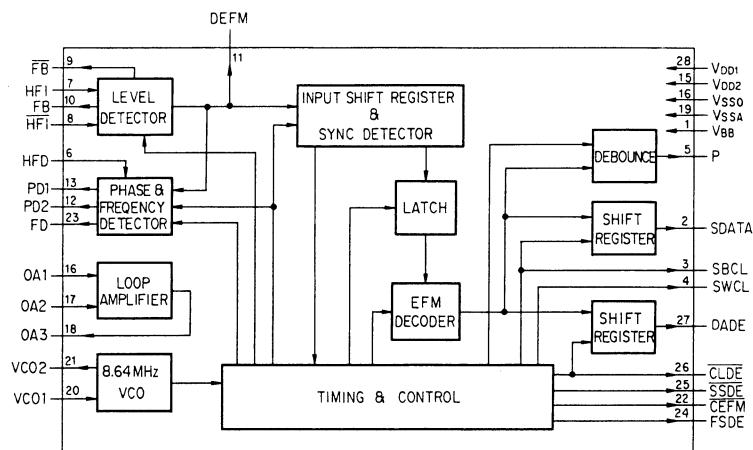
Description of terminals <SAA-7010>

Pin No.	Symbol	Function and operation
1	VBB	−2.5V. Back Bias Supply.
2	SDATA	Push-pull output for subcoding data. An 8 bit burst of data (including a 1 bit subcoding frame sync) is output serially once per frame coincident with SBCL.
3	SBCL	Push-pull output for subcoding bit clock. An 8 bit burst clock at nominally 2.1609MHz which is used to sychronise the subcoding data.
4	SWCL	Push-pull output for subcoding word clock. A square wave signal at data frame rate (7.35kHz) used to synchronise the subcoding words and the pause (P) bit.
5	P	Push-pull output for the subcoding Pause bit. This signal is derived from the encoded subcoding word and is used to indicate a music pause. A debounce circuit is incorporated to eliminate erroneous data.
6	HFD	Input from external High Frequency Detector. When this signal is high the frequency detector output (FD) and phase detector are enabled.
7	HFI	Non-inverting input to the Level Detector. A differential signal of between 0.5V and 2.5V peak-peak is required between pins 7 and 8 drive the Level Detector correctly.
8	HFI	Inverting inpu to the Level Detector.
9	FB	Inverted feedback output from the Level Detector. These outputs (FB and FB) have a nominal impedance of 10kΩ and will default to 1/2 VDD1 when a drop-out is sensed.
10	FB	Non-inverted feedback output from the Level Detector (see FB).
11	DEFM	Push-pull output for EFM data after it has passed through the level detector.
12	PD2	Phase Detector output signal. These outputs (PD1 and PD2) have a nominal impedance of 10kΩ and the differential dc content of the signals is a measure of the phase difference between the data and the internal 4.3218MHz clock.
13	PD1	Phase detector reference signal. (see PD2)

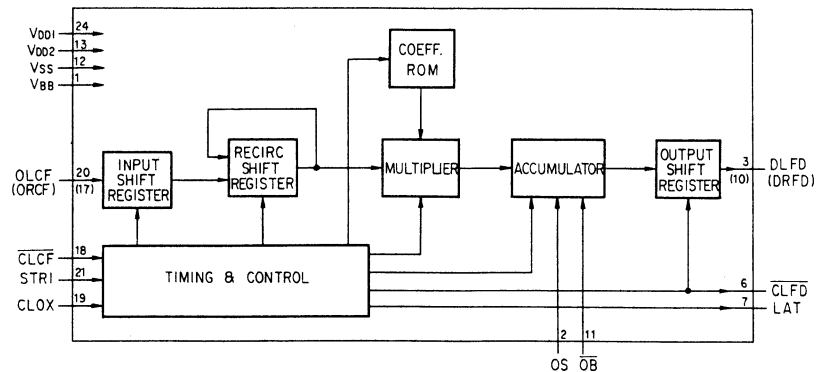| Pin No.	Symbol	Function and operation
14	VSSD	Digital Ground. Main ground terminal
15	VDD2	+12V supply.
16	OA1	Non-Inverting input to the Operational Amplifier.
17	OA2	Inverting input to the Operational Amplifier.
18	OA3	Source follower output of Operational Amplifier.
19	VSSA	Analogue Ground. Ground terminal for Operational Amplifier only. Connected internally to VSSD via a nominal 25Ω resistor.
20	VC01	Input to Voltage Controlled Oscillator amplifier. The amplifier is a simple inverter designed for up to 10MHz operation. The frequency control is achieved via an external 'Varicap' tuned circuit.
21	VC02	Output from Voltage Controlled Oscillator amplifier. The load for the inverting transistor may be turned off for test purposes by reducing VDD2 to 0V.
22	CEFM	A push-pull output from the internal 4.3218MHz clock generator.
23	FD	Three state push-pull output from the Frequency Detector. This output has a nominal 1kΩ impedance when active but assumes a high impedance state once the system is in lock.
24	FSDE	Push-pull output for Frame Sync signal to ERCO. A positive going pulse occuring at the end of each data frame (nominal frequency 7.35kHz).
25	SSDE	Push-pull output for Symbol Sync. signal to ERCO. A negative going pulse occuring during the last bit of each data symbol (nominal frequency 254kHz).
26	CLDE	Push-pull output for Data bit clock to ERCO. An 8 bit burst clock at nominally 2.1609MHz which is used to synchronise the data to ERCO.
27	DADE	Push-pull output for Data to ERCO. Serial data consisting of 32×8 bit symbols per frame which is synchronised to CLDE.
28	VDD1	+5V Supply.

Description of terminals <SAA-7020>

Pin No.	Symbol	Function and operation
1	VBB	Supply. This pin will be connected externally to a −2.5V supply for back bias.
2	FSEC	Output. Output data clock, data is valid on the falling edge.
3	C1 FLAG	Output. This pin is not connected for nomal operation, it is for testing purposes. Indicating Flags in the C1 Flag store and hence showing the positions of multiple errors.
4	MCES	Output. This is an open drain output providing a pulse-width modulated signal to control the rate of data entry. If the data rate has been correct for a period, MCES will have a 50% duty cycle. If MCES is mostly high data is entering too slowly and if MCES is mostly low data is entering to quickly.
5	DADE	Input. This pin takes in the data for processing from the DEMOD I.C. Data is clocked in by CLDE in 8 bit symbols, m.s.b. first.
6	CLDE	Input. This is the clock for the data input. Data is accepted into DADE on the negative edge of CLDE.
7	SSDE	Input. This signal indicates the last bit of each 8 bit symbol. If it is low during the negative transisition of CLDE a symbol is counted and clocked in, therefore SSDE must remain low for only one negative transition in eight for correct operation.
8	FSDE	Input. A high on this pin during the negative transition of CLDE indicates the end of a frame of data. The minimum duration of FSDE is critical at high rates of data input, to ensure no FSDE pulses are missed causing erroneous speed indications of MCES.
9— 19	AOER— AAER	Outputs. Eleven address outputs to 2K8 Ram. Provided data is being received by DADE, CLDE etc. then address AOER to AAER are completely exercised every four frames enabling refresh to be automatic for pseudo-static rams.
20	VSS	Supply. Ground supply for ERCO.
21	VDD2	Nominal 12V supply.

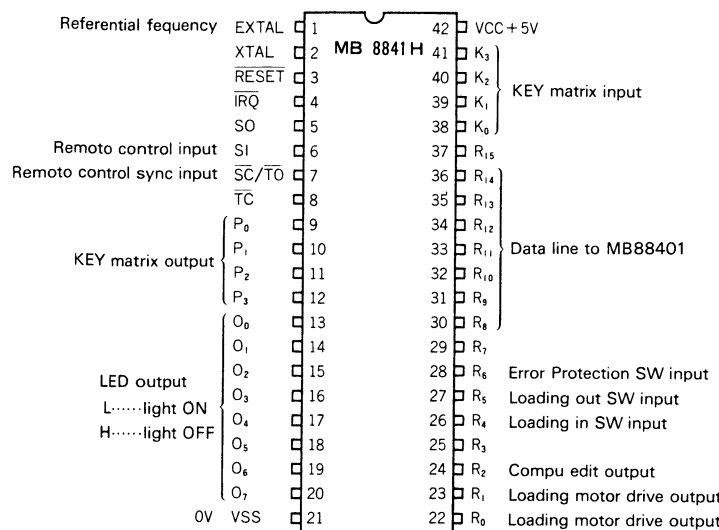| Pin No.	Symbol	Function and operation
22	TEST	Input. This pin should be connected directly to VDD1 or VDD2 for normal operation.
23	CLOX	Input. This is the basic Clock input for the ERCO I.C. A nominal frequency of 4.2336MHs is fed in from the CIM I.C.
24	WEER	Output. Write enable bar for control of the memory, when low ERCO is writing to the RAM.
25	OEER	Output enable bar for control of the memory output buffers, when low the memory outputs must be tri-stated.
26	CEER	Output. Chip enable bar for use with pseudostatic memories.
27	CLEC	Output data clock, data is valid on the falling edge.
28— 35	DOER— D7ER	Inputs/Outputs. An 8 bit parallel data bus between ERCO and the RAM. The outputs are high impedance state when OEER is low.
36	UNEC	Output. Unreliable data flag, when high indicates that output data is unreliable. During active data output (i.e. when CLEC is operating) UNEC applies to each symbol of 8 bits of data output at that time. Before each data word of two symbols is output, UNEC applies to the whole data word that will follow in five frames time.
37	DAEC	Data output to CIM I.C. Data is output in 16 bit words separated by gaps. Each word is in two's complement format with msb first and is made up of 2×8 bit symbols. Between the data words the state of the GAP pin is output. Data is valid on the falling edge of CLEC.
38	GAP	Input. The state of this pin is reflected in the state of the data output between words on DAEC. It is used to pass information with the data words. A high on GAP making the GAP level on DAEC high and vice versa.
39	SMSE	Input. If SMSE is held low the UNEC output will be held high. This input is used to cause the CIM I.C. to mute the data.
40	VDD1	Nominal 5V supply.

12

•SAA7030 (Digital Filter)

Description of terminals <SAA-7030>

Pin No.	Symbol	Function and operation
1	VBB	−2.5V ± 0.5V supply.
2	OS	Offset select input. When connected to VDD1 the data output has a fixed DC offset of 3%. When connected to VSS the output has no offset.
3	DLFD	Left channel data output. The data is 14 bit serial, MSB first and is valid on the falling edge of output clock $\overline{CLFD}$.
6	$\overline{CLFD}$	Output data clock, nominal frequency 4.2336MHz (=CLOX). The falling edge of this signal defines output data valid.
7	LAT	Output 176.4MHz strobe. The rising edge of this pulse says that the output of a 14 bit data word has been completed.
10	DRFD	Right channel data output.
11	$\overline{OB}$	Offset Binary Not Input. When connected to VDD1 the output data is coded as 2's complement. When connected to VSS the output data is coded as Offset Binary.
12	VSS	Ground
13	VDD2	12V ± 10% supply
15	TINR	Test input (R). Right channel test chain input. In normal operation this pin should be connected to either VSS or VDD1.
16	TINL	Test input (L). Left channel test chain input.
17	DRCF	Right Channel Data Input. Data should be 16 bit serial, MSB first, offset binary coded. It should be valid on the falling edge of the data clock $\overline{CLCF}$.
18	$\overline{CLCF}$	Input Data Clock. The falling edge of this signal defines input data valid.
19	CLOX	Master Input Clock. runs continuously at a nominal frequency of 4.2336MHz.
20	DLCF	Left Channel Data Input. See DRCF.

| Pin No.	Symbol	Function and operation
21	STR1	Input 44.1kHz strobe. The circuit's internal timing chain is synchronized by the rising edge of STR1 which must run synchronously with CLOX in accordance with the timings specified in the Electrical Characteristics. The rising edge should follow the completion of the input data stream.
22	RT	Reset Test Not Input. When low resets the part of the acumulator not reset in normal operation to initialise the accumulator for testing. In normal operation should be connected to VDD1.
23	TE	Test Enable Not Input. When low switches the internal circuitry into the sequertial scan test mode. In normal operation should be connected to VDD1.
24	VDD1	5V ± 10% supply.

5. OPERATION OF MICRO COMPUTER MB8841 & MB88401

5-1. MB8841H
•Function of Terminal
•Key Matrix Scan
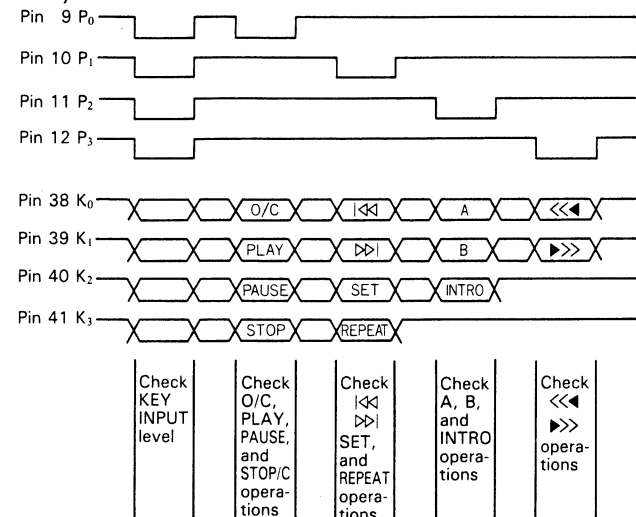
•LED output of SIC1 (8841H)

| Pin	i/s	LED	Operation
13	O0	DISC SET	Warning: during OPEN/CLOSE operation ON: when disc is present Note) Quick warning in hardware error
14	O1	PLAY	ON: during PLAY operation inclusive of PAUSE and INTRO
15	O2	PROGRAM	Warning: when musics more than 15 are stored Informs that programmed musics are selectably stored in memory.

LED comes on when static display operates. L······ ON H······ OFF

| Pin	i/s	LED	Operation
16	O3	PAUSE	ON: during PAUSE operation
17	O4	REPEAT	ON: during REPEAT operation
18	O5	INTRO	ON: during INTRO SKIP operation
19	O6	A, B	Warning: by A input, ON: by B input
20	O7	RECEIVED	ON 500msec: when remote control signal is received

•Operation timing of SIC1 (8841H) system
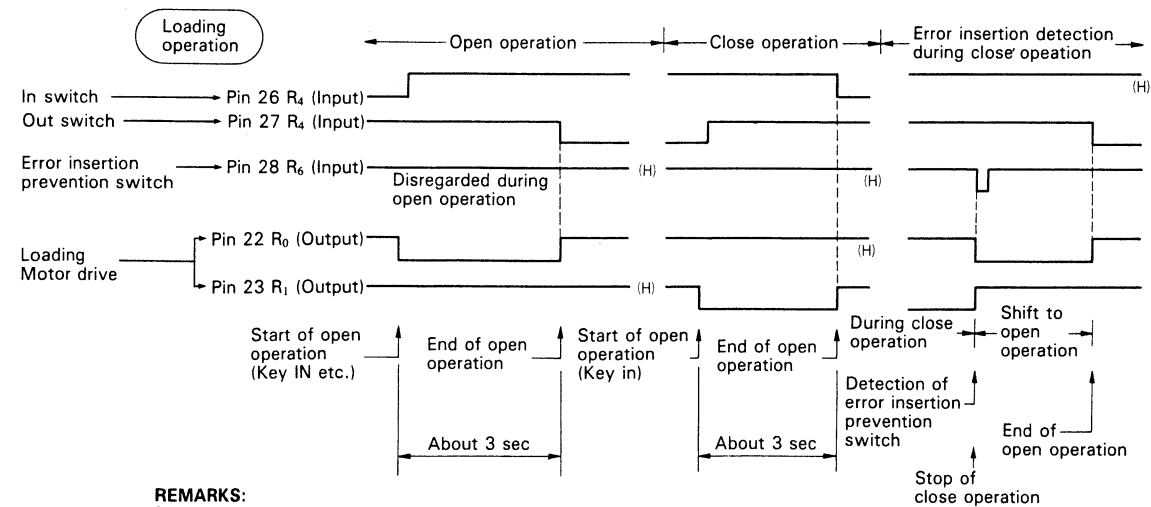
REMARKS:
During loading operation, DISC SET LED comes on at about 0.5 Hz for warning. When no predetermind signal is inputted for 10 sec or more, the operation stops and DISC SET LED comes on at about 0.2 Hz for warning of hardware error.

H: Pause stand-by on cassette side
L: Recording on cassette side

13
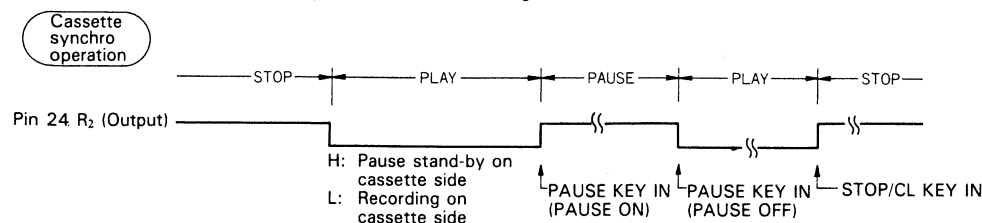
7. PARTS LOCATION & PARTS LIST

7-1. S-2011 Mechanism Servo Control Circuit Board (Stock No. 13706101)

Component Side
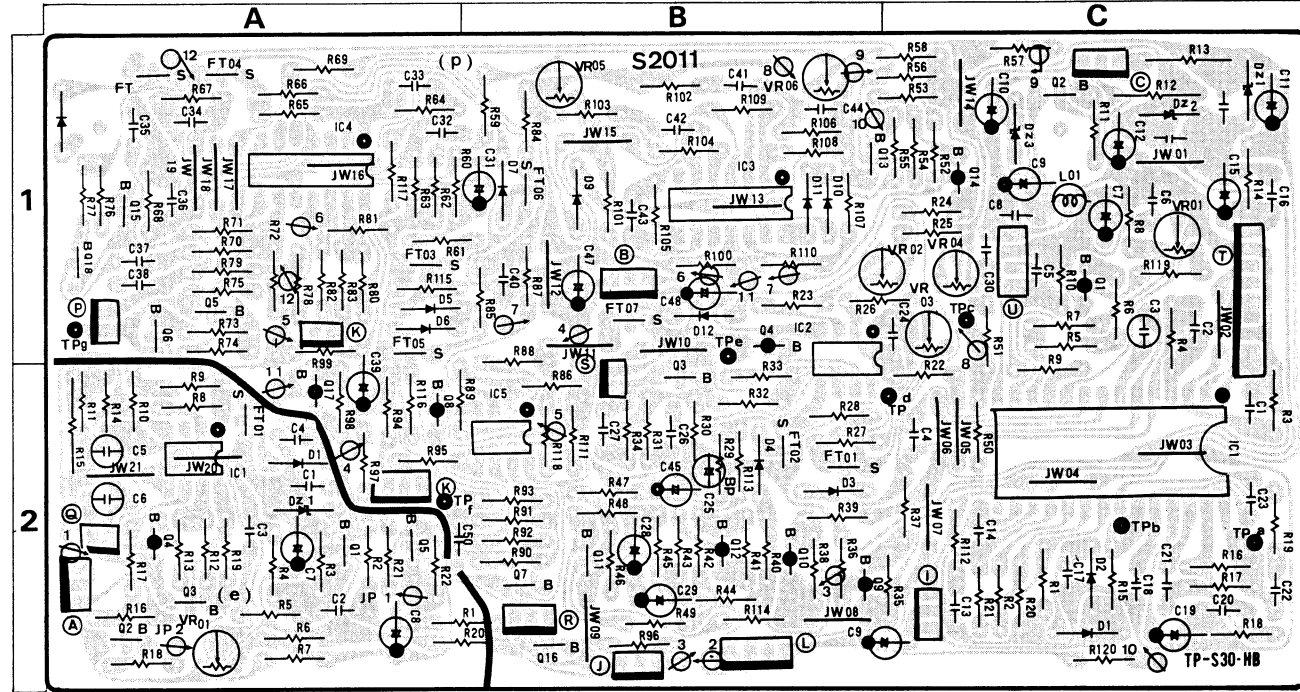
Parts List

Parts No.	Stock No.	Description
•Transistor		
eQ1	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
eQ2	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
eQ3	46149401	2SD794
eQ4	46149301	2SB744
eQ5	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
•FET		
eFT1	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
•IC		
eIC1	03607700	NJM4558D
•Diode		
eD1	03117600	1S2473T77
•Zener Diode		
eDZ1	46111500	05Z 5.6-Y
eR15	46624000	56Ω 2W N.I.R
eC5	08451700	10 μF 50V E.B.
eC6	46368200	22 μF 25V E.B.
EVR1	46924600	47kΩ(B) S.V.R., Main Motor

Parts No.	Stock No.	Description
•Transistor		
pQ1	46359701	2SA952
pQ2	46359701	2SA952
pQ3	46149401	2SD794
pQ4	46149301	2SB744
pQ5	46149401	2SD794
pQ6	46149301	2SB744
pQ7	46149401	2SD794
pQ8	46149301	2SB744
pQ9	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ10	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ11	46367102	2SC2603
	or 46367301	2SC2458
	or 46361901	2SC2785
pQ12	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ13	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
pQ14	46367001	2SA1115
	or 46362201	2SA1048
	or 46392001	2SA1175
pQ15	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
pQ16	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
pQ17	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ18	46367001	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785

Parts List <S-2011>

Parts No.	Stock No.	Description
•FET		
pFT1	46643800	2SJ103-Y
	or 46643801	2SJ103-GR
	or 46643802	2SJ103-BL
pFT2	46643800	2SJ103-Y
	or 46643801	2SJ103-GR
	or 46643802	2SJ103-BL
pFT3	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT4	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT5	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT6	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT7	46643800	2SJ103-Y
	or 46643801	2SJ103-GR
	or 46643802	2SJ103-BL
pFT8	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1

Parts No.	Stock No.	Description
•IC		
pIC1	46707500	HA12049A
pIC2	03607700	NJM4558D
pIC3	07258300	MB3614M
pIC4	07258300	MB3614M
pIC5	03667700	NJM4558D
•Diode		
pD1	03117600	1S2473T77
pD2	03117600	1S2473T77
pD3	03117600	1S2473T77
pD4	03117600	1S2473T77
pD5	03117600	1S2473T77
pD6	03117600	1S2473T77
pD7	03117600	1S2473T77
pD9	03117600	1S2473T77
pD10	03117600	1S2473T77
pD11	03117600	1S2473T77
pD12	03117600	1S2473T77
pD13	03117600	1S2473T77
•Zener Diode		
pDZ1	46111500	05Z 5.6-Y
pDZ2	46111500	05Z 5.6-Y
pDZ3	46112700	05Z 8.2-Y
pC3	08451700	1 μF 50V E.B.
pC25	08451700	1μF 50V E.B.
pC31	08451700	1μF 50V E.B.
pC34	46281800	1000pF 50V F.C.
pC35	46286100	0.22μF 63V F.C.
pC40	46286100	0.22μF 63V F.C.
pC42	46281800	1000pF 50V F.C.
pC45	08451000	10μF 16V E.B.
pL1	46706800	Inductor
pVR1	46738600	4.7kΩ S.V.R., Laser Power
pVR2	46738700	10kΩ S.V.R., Focus offset
pVR3	46738700	10kΩ S.V.R., Focus Gain
pVR4	46738700	10kΩ S.V.R., Tracking offset
pVR5	46738700	10kΩ S.V.R., Tracking Gain
pVR6	46738700	10kΩ S.V.R., Tracking Millar

7-2. S-2005 Remote Control Circuit Baord (Stock No. 13701501)

Component Side
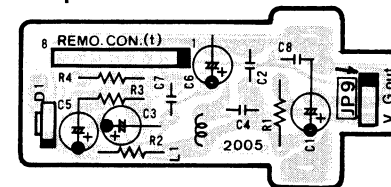
Parts List

Parts No.	Stock No.	Description
•IC		
tIC1	46707600	μPC1373H
tD1	46706900	PH302 Photo Diode
tL1	46090700	Inductor 3.9MH
⚠ tR1	00130900	100Ω 1/2W N.I.R.

7-3. S-2002 Power Fuse Circuit Board <XX, CS>

Component Side
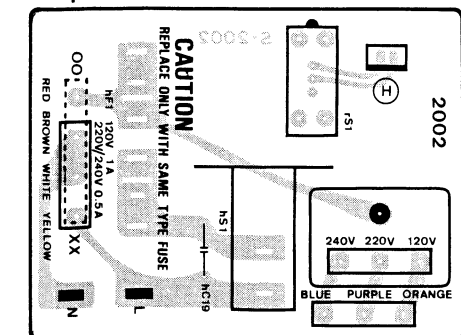
Parts List

Parts No.	Stock No.	Description
⚠ hC19	46425800	0.01 μF 400V C.C.
⚠ hSW1	46364300	Push SW., POWER
⚠ hF1	07188600	2A 250V AC Fuse
⚠	07188400	1A 250V AC Fuse

7-4. S-2006 Mother Circuit Board (Stock No. 13701601)
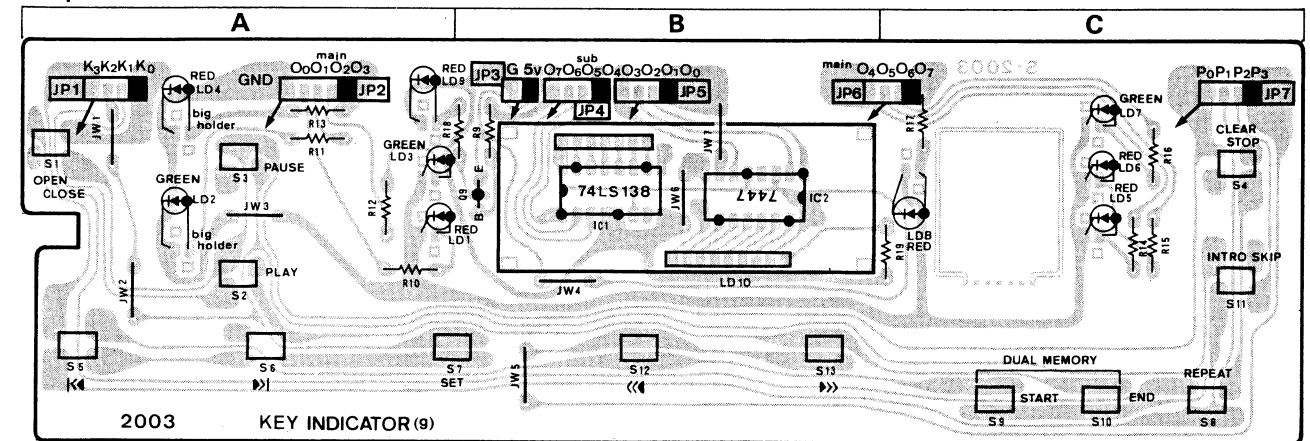
Component Side
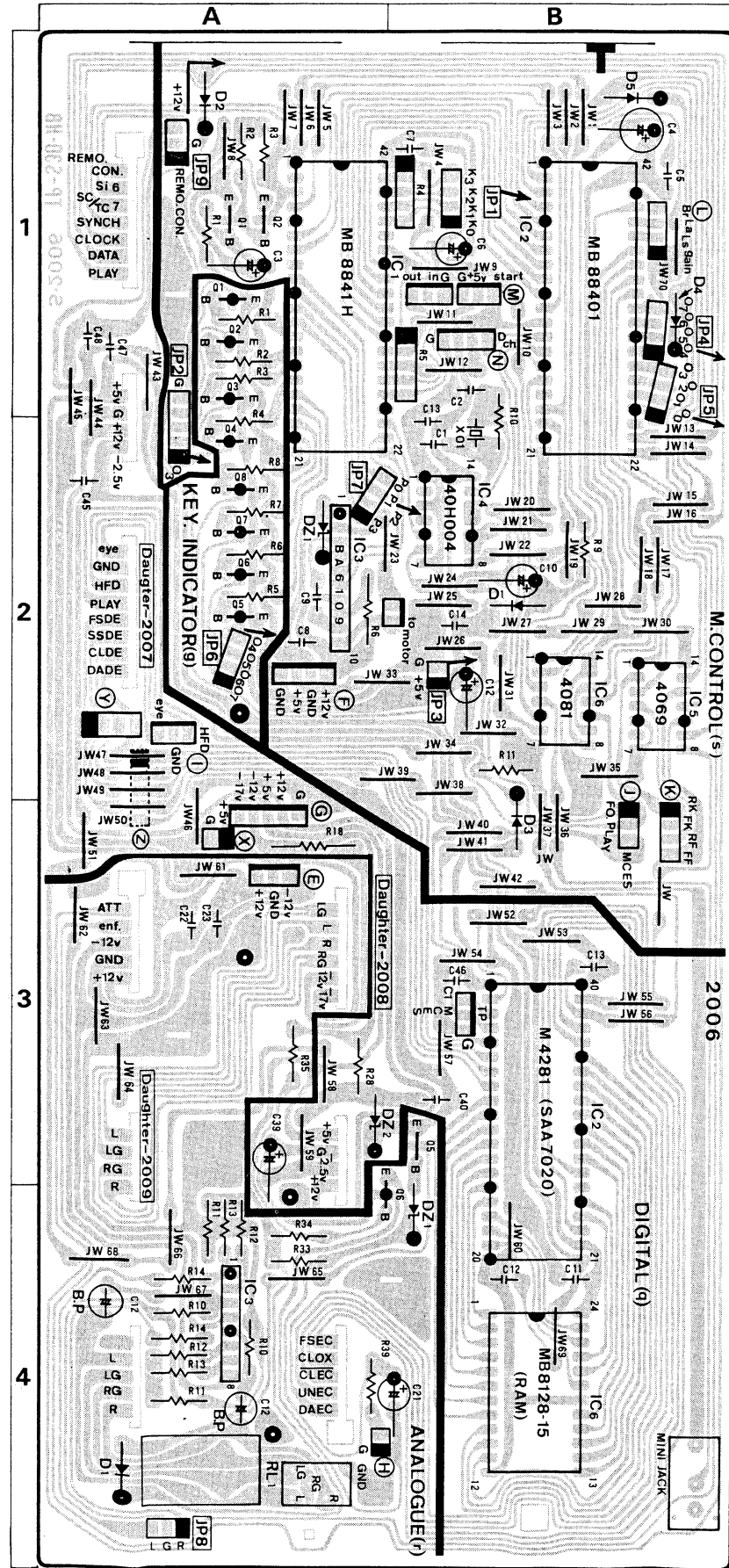
Parts List

Parts No.	Stock No.	Description
•Transistor		
gQ1	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ2	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ3	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ4	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ5	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ6	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ7	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ8	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
	46547200	Jack
•IC		
qIC2	46722400	SAA7020
qIC6	46707200	MSM2128-15RS
	or 46707300	MB8128-15
•Diode		
qD5	03111600	1S2473D
qD6	03117600	1S2473T77
•Zener Diode		
qDZ2	46109100	05Z 2.7-Y
•Transistor		
rQ5	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
rQ6	46367201	2SA1048
	or 46392001	2SA1175
•IC		
rIC3	46078900	M5218L
•Diode		
rD1	03117700	10E2
•Zener Diode		
rDZ1	46109100	05Z 2.7-Y
rC12	08451000	10μF 16V E.B.
rRL1	46706400	Relay
•Transistor		
sQ1	46367301	2SC2458
	or 46391901	2SC2785
sQ2	46367301	2SC2458
	or 46391901	2SC2785
•IC		
sIC1	46720700	MB8841H-1225M
sIC2	46720600	MB88401-254M
sIC3	07233100	BA6109
sIC4	46428900	TC40H004P
sIC5	07107600	TC4069UBP
	or 07207400	MB84069BM

Parts List <S-2006>

Parts No.	Stock No.	Description
sIC6	07245800	TC4081BP
	or 46164400	MB84081B
sX01	07225300	Quartz Element, LN-X-046
	or 07225301	Quartz Element, 4.0MHz
•Diode		
sD1	03117600	1S2473T77
sD2	03117600	1S2473T77
sD3	03117600	1S2473T77
sD4	03117600	1S2473T77
sD5	03117600	1S2473T77
sR4	46038500	10kΩ×4 1/8W A.R.
sR5	46038500	10kΩ×4 1/8W A.R.
⚠ sR6	00140300	2.2Ω 1W N.I.R.

7-5. S-2003 Function Switch Circuit Board (Stock No. 13701301)

Component Side

Parts List

Parts No.	Stock No.	Description
•Transistor		
gQ9	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
•IC		
gIC1	46720400	MB74LS138
	or 46721200	M74LS138P
gIC2	46720500	HD7447A
	or 46720900	M53247P
•LED		
gLD1	46095200	TLR123
gLD2	07250900	TLG-123A
gLD3	07250900	TLG-123A
gLD4	46095200	TLR123
gLD5	46095200	TLR123
gLD6	46095200	TLR123

Parts No.	Stock No.	Description
gLD7	07250900	TLG-123A
gLD8	46095200	TLR123
gLD9	46095200	TLR123
gLD10	46706100	7 Segment LED Ass'y
gSW1	46549500	Push SW., OPEN/CLOSE
gSW2	46549500	Push SW., PLAY
gSW3	46549500	Push SW., PAUSE
gSW4	46549500	Push SW., STOP
gSW5	46549500	Push SW., I◄◄
gSW6	46549500	Push SW., ►►I
gSW7	46549500	Push SW., SET
gSW8	46549500	Push SW., REPEAT
gSW9	46549500	Push SW., START
gSW10	46549500	Push SW., END
gSW11	46549500	Push SW., INTRO SKIP
gSW12	46549500	Push SW., ◄◄◄
gSW13	46549500	Push SW., ►►►

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7-6. S-2016 Mechanism Control Circuit Board

Component Side   (Stock No. 13723201)
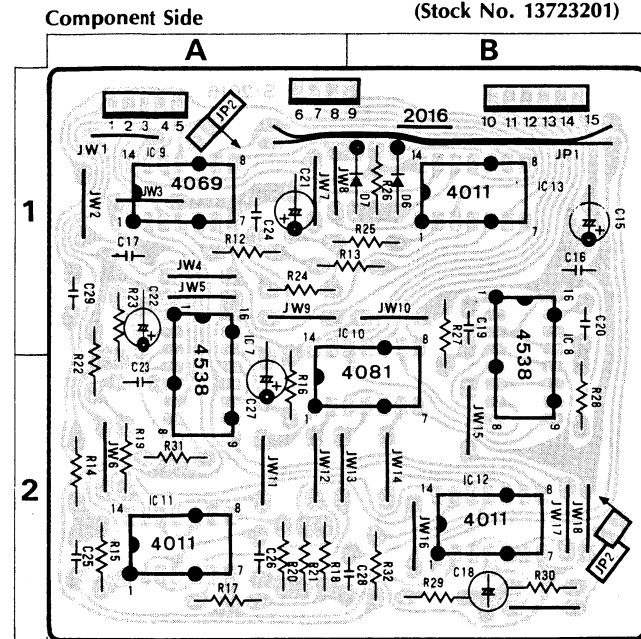
Parts List

Parts No.	Stock No.	Description
•IC		
sIC7	46160800	TC4538BP
or	46122900	MSM4538RS
sIC8	46160800	TC4538BP
or	46122900	MSM4538RS
sIC9	07107600	TC4069UBP
or	07207400	MB84069BM
or	03605700	MSM4069RS
sIC10	07245800	TC4081BP
or	46164400	MB84081B
or	07272700	MSM4081RS
sIC11	03604100	TC4011P
or	07207200	MB84011BM
or	03604000	MSM4011RS
sIC12	03604100	TC4011P
or	07207200	MB84011BM
or	03604000	MSM4011RS
sIC13	03604100	TC4011P
or	07207200	MB84011BM
or	03604000	MSM4011RS
•Diode		
sD6	03117600	1S2473T77
sD7	03117600	1S2473T77
sC18	08451700	1μF 50V E.B.
sC19	46283300	0.22μF 50V F.C.
sC20	46283300	0.22μF 50V F.C.

7-7. S-2008 D/A Converter (Stock No. 13705801)

Component Side
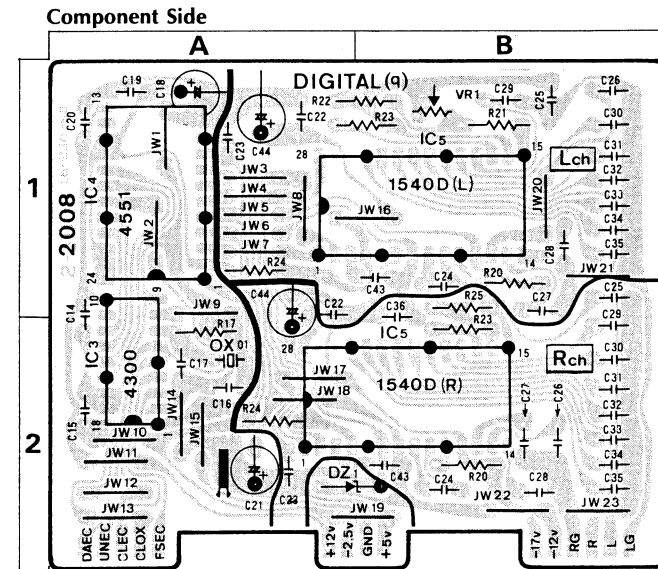
Parts List

Parts No.	Stock No.	Description
•IC		
qIC3	46721500	SAA7000
qIC4	46721600	SAA7030
qIC5	46707400	TDA1540D
qX01	46708300	Quartz Element, 4.2336MHz
•Zener Diode		
qDZ1	46111500	05Z 5.6-Y
qR21	00209700	560Ω 1/4W M.R.
qR22	00205700	270Ω 1/4W M.R.
qR23	00211600	82Ω 1/4W M.R.
qR25	00210200	620Ω 1/4W M.R.
qC27	46286100	0.22μF F.C.
qVR1	10335900	220Ω(B) S.V.R., Level Balance

7-8. S-2007 Modulation/PLL Circuit Board

Component Side   (Stock No. 13701701)
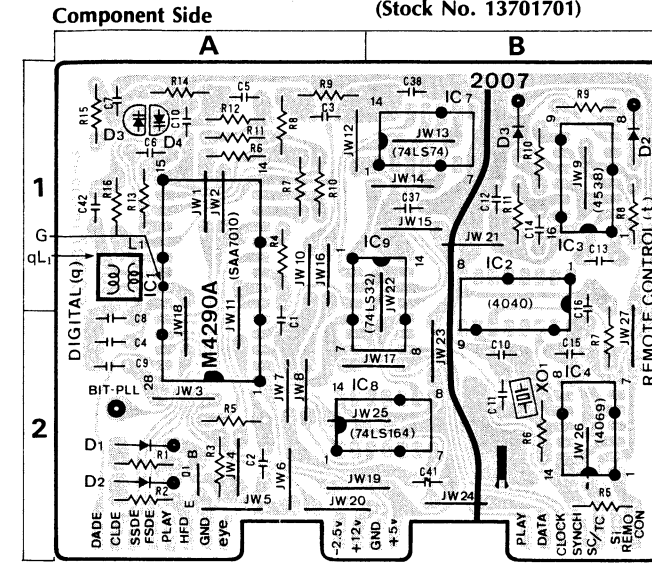
Parts List

Parts No.	Stock No.	Description
•Transistor		
qQ1	46367101	2SC2603
or	46367301	2SC2458
or	46391901	2SC2785
•IC		
qIC1	46721400	SAA7011
qIC7	46429600	MB74LS74AM
or	46636800	M74LS74
qIC8	46430200	MB74LS164M
or	47221300	M74LS164P
qIC9	46721000	MB74LS32
or	46721100	M74LS32P
•Diode		
qD1	03117600	1S2473T77
qD2	03117600	1S2473T77
qD3	46708400	SVC321
qD4	46708400	SVC321
qL1	46706700	VCO Coil
•IC		
tIC2	46720100	TC4040BP
or	46720200	MB84040B
tIC3	46160800	TC4538BP
tIC4	07107600	TC4069UBP
or	07207400	MB84069BM
•Diode		
tD2	03117600	1S2473T77
tD3	03117600	1S2473T77
tXO1	07274000	CSB550A, Ceramic Filter

7-9. S-2000 Power Supply Circuit Board

Component Side   (Stock No. 13701001)
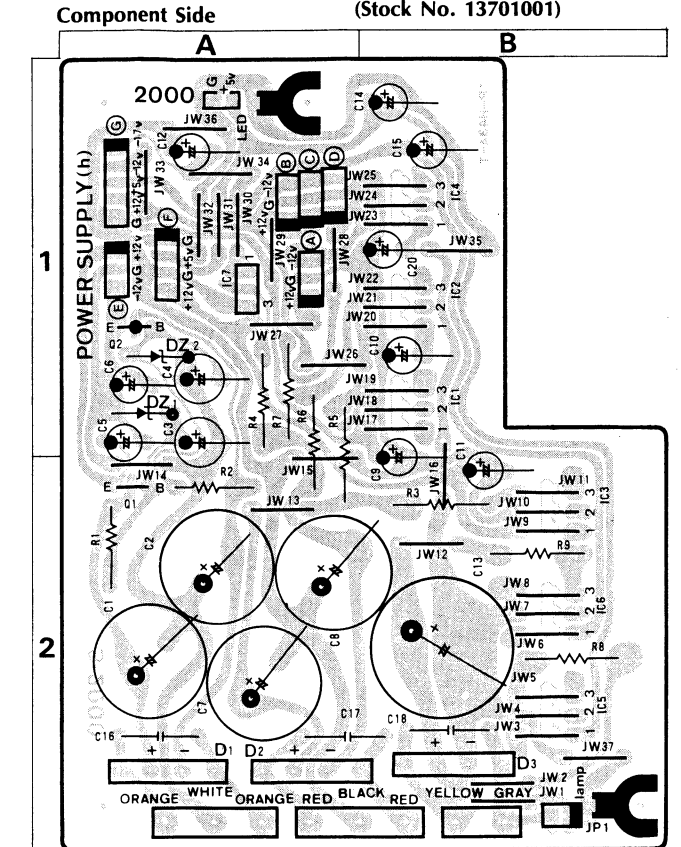
Parts List

Parts No.	Stock No.	Description
•Transistor		
hQ1	46359801	2SC2001
hQ2	46359701	2SA952
•IC		
hIC1	46144600	NJM78M12A
hIC2	46581200	NJM79M12A
hIC3	46144600	NJM78M12A
hIC4	46581200	NJM79M12A
hIC5	46720300	μPC7805H
hIC6	46720300	μPC7805H
hIC7	46581400	NJM79M18A
or	46544600	NJM79L18A
•Diode		
hD1	07193300	UB-152LFF
hD2	03117000	RB-152
hD3	03117000	RB-152
nD4	46445500	10YD4.5-A
hD5	46445500	10YD4.5-A
•Zener Diode		
hDZ1	46114200	05Z13-Y
hDZ2	46114200	05Z13-Y
hC1	46628700	1000μF 50V E.C.
hC2	46628700	1000μF 50V E.C.
hC13	46271200	25V 3300 μF E.C
hC16	00411600	0.047 μF 400V P.C.
hC17	00411600	0.047 μF 400V P.C.
hC18	00411600	0.047 μF 400V P.C.
hR3	46240900	5.6Ω 1W N.I.R.
hR5	46290900	5.6Ω 1W N.I.R.
hR6	46240900	5.6Ω 1W N.I.R.
hR7	46240900	5.6Ω 1W N.I.R.
hR8	46240000	1Ω 1W N.I.R.
hR9	46240000	1Ω 1W N.I.R.

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7-10. S-2015 Analog Filter Circuit Board

Component Side   (Stock No. 13721701)
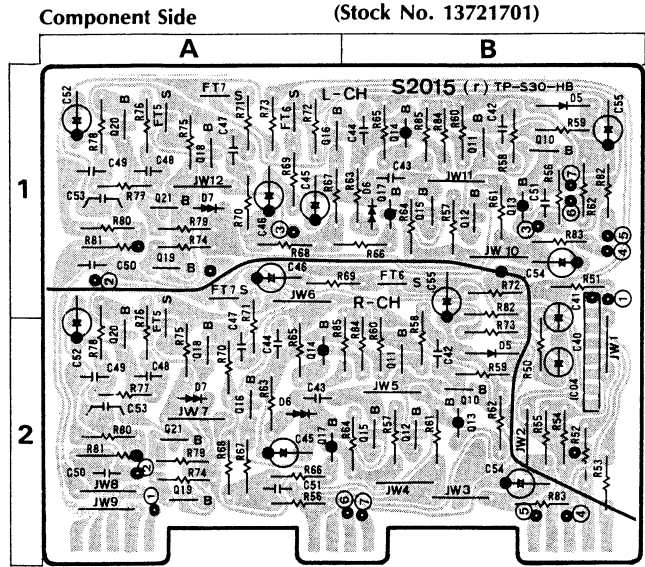
Parts List

Parts No.	Stock No.	Description
•Transistor		
rQ10	46926201	2SC2784
rQ11	46926201	2SC2784
rQ12	46926201	2SC2784
rQ13	46926101	2SA1174
rQ14	46926101	2SA1174
rQ15	46926201	2SC2784
rQ16	46926201	2SC2784
rQ17	46926101	2SA1174
rQ18	46926201	2SC2784
rQ19	46926201	2SC2784
rQ20	46926201	2SC2784
rQ21	46926201	2SC2784
•FET		
rFT5	46643502	2SK163
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
rFT6	46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
rFT7	46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
•IC		
rIC4	46078900	M5218L
•Diode		
rD5	03117600	1S2473T77
rD6	03104900	SV02Y
rD7	03104900	SV02Y
rC40	08451700	1μF 50V E.B.
rC41	08451700	1μF 50V E.B.
⚠ rR82	00135800	4.7Ω 1/2W N.I.R.
⚠ rR83	00135800	4.7Ω 1/2W N.I.R.

7-11. S-2013 Flip-Flop Circuit Board

Component Side
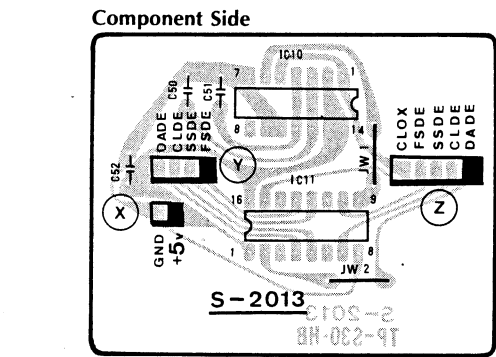
Parts List

Parts No.	Stock No.	Description
•IC		
qIC10	46863100	MB74LS86
	or 46545600	M74LS86P
qIC11	46863200	MB74LS175
	or 46863700	M74LS175P

7-12. S-2001 Pilot Lamp Circuit Baord

Component Side
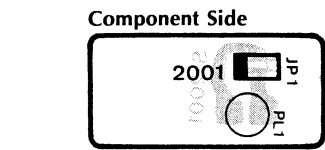
Parts List

Parts No.	Stock No.	Description
	07913900	Lamp Holder T47
gPL1	46836100	Pilot Lamp 8V 0.2A

7-13. S-2004 Phones Jack Circuit Board

Component Side
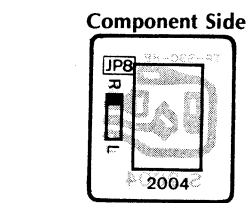
Parts List

Parts No.	Stock No.	Description
	46706300	Jack

7-14. S-2010 Disc Detector LED Circuit Board

Component Side
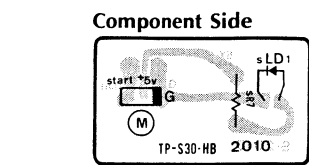
Parts List

Parts No.	Stock No.	Description
•LED		
sLD1	46095200	TLR123

7-15. S-2012 Disc Photo-Transistor Circuit Board

Component Side
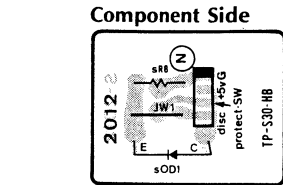
Parts List

Parts No.	Stock No.	Description
sOD1	46719500	PH102, Photo Transistor

7-16. S-2014 Power Supply Circuit Board

Component Side   <EU, BS>
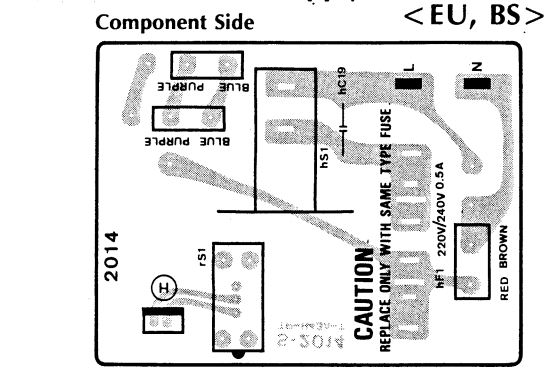
Parts List

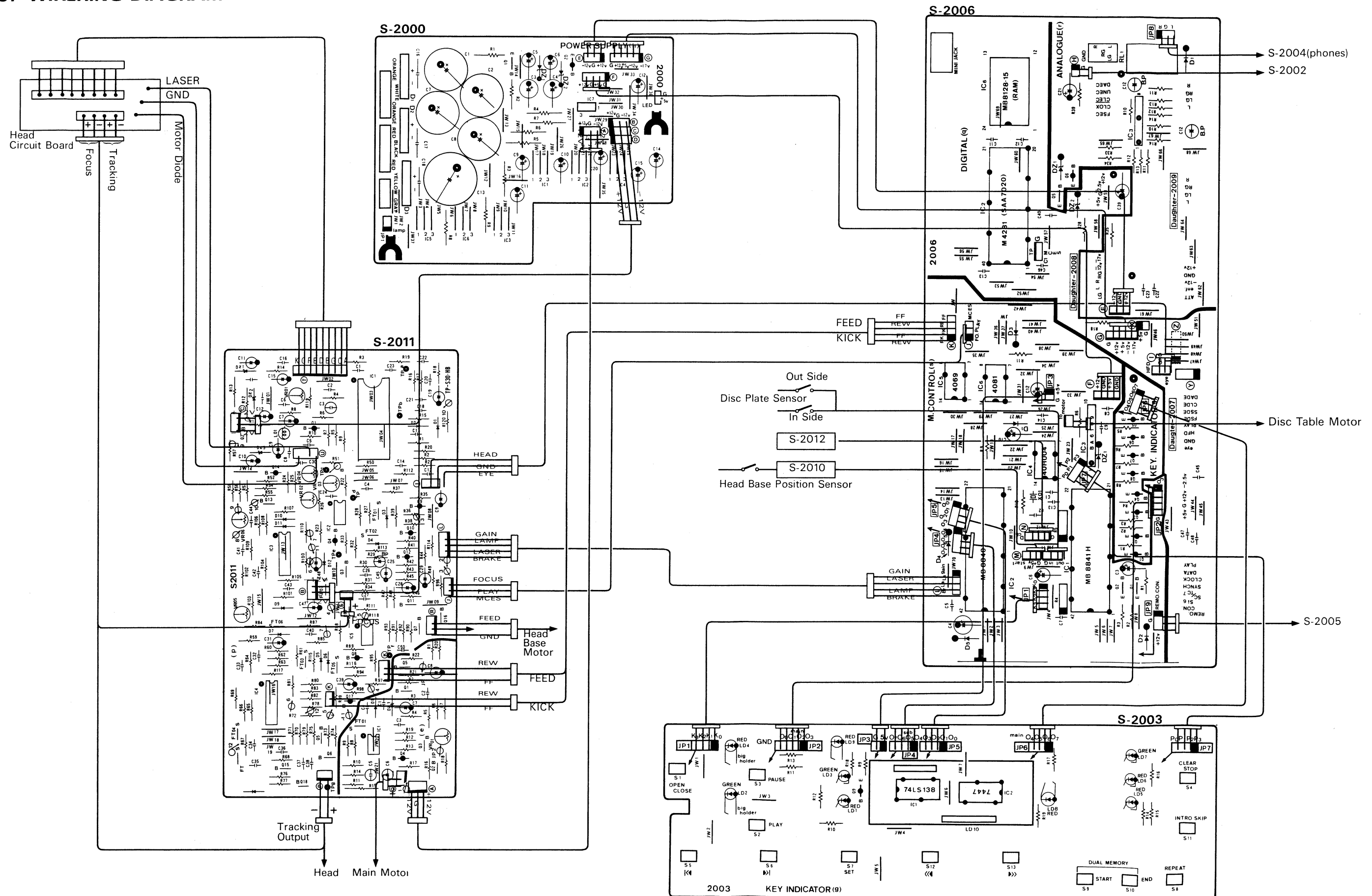| Parts No.	Stock No.	Description
dZ0235S	47139300	LB Fuse
⚠ hC19	46425800	10000pF 400V C.C.
⚠ hSW1	46364300	Push SW., POWER

8. How to Set String for driving Disc Table (See Fig. 8-1)

1) Remove mechanism assembly.
2) Turn on main switch and then pull disc table at its extreme end.
3) Turn off main switch and extract the power supply plug from socket outlet.
4) Connect string to S1 and set the string in accordance with the procedure from ① to ⑰ shown below.
   Fix the string at S2.
5) Turn on main switch and check that disk table operates normally repeating the opening and closing of disc table.

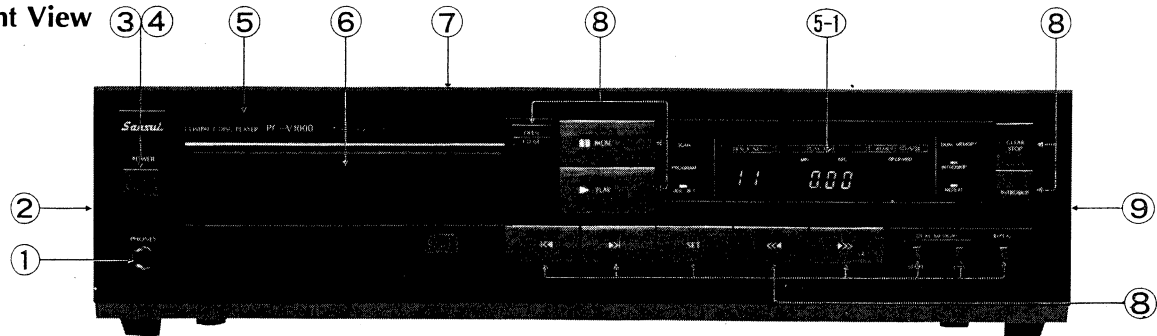•Stock No. of driving string (1.6m)
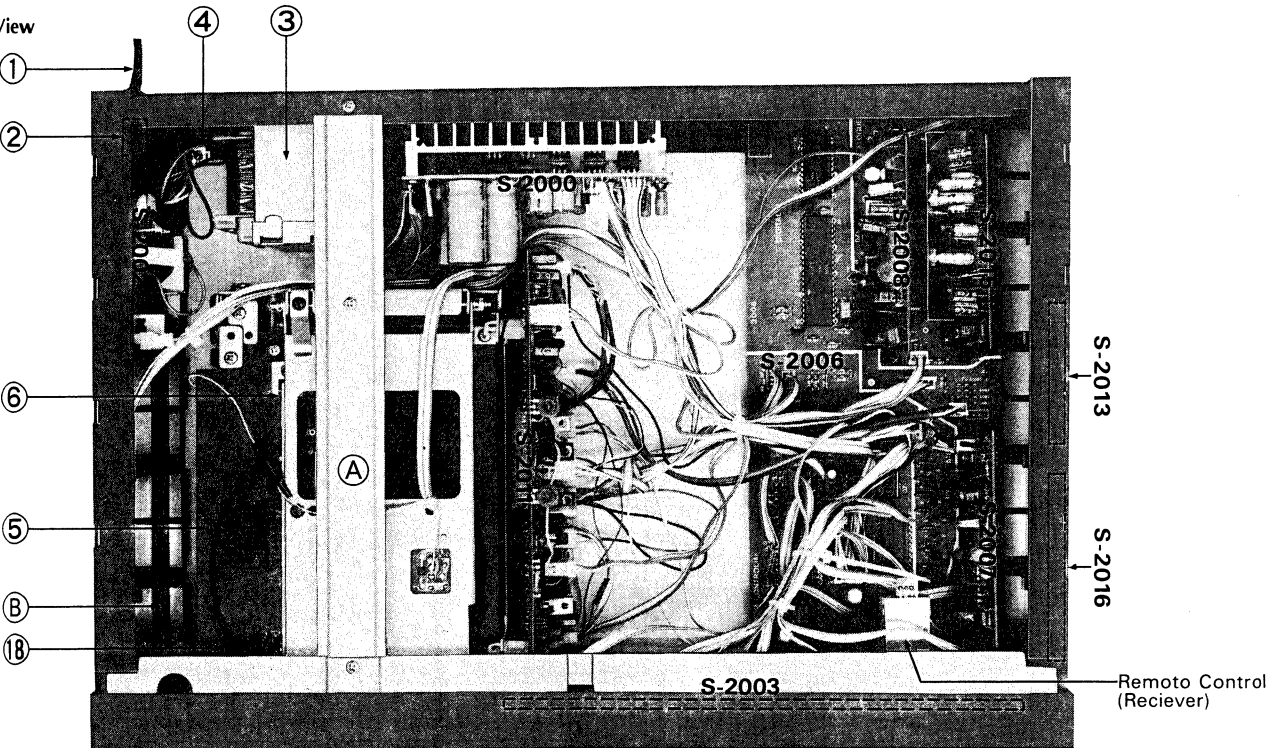 Stock No. 13721800

Fig.8-1

9. WIRERING DIAGRAM

S-2000

S-2006

POWER SUPPLY

2000

ANALOGUE(r)

→ S-2004(phones)
→ S-2002

MINI JACK

IC6
MBB128-15 (RAM)

DIGITAL (q)

Daughter-2006

IC2 (5AA7)20)
M 4231

2006

Daughter-2008

LASER
GND

Head
Circuit Board

Focus
Tracking
Motor Diode

FEED   FF   REVV
KICK   FF   REVV

M.CONTROL(9)
IC5   4069   IC6   4081

Out Side
Disc Plate Sensor
In Side

S-2012

S-2010
Head Base Position Sensor

→ Disc Table Motor

KEY. INDICATOR

Daughter-2007

→ S-2005

S-2011

HEAD
GND
EYE

GAIN
LAMP
LASER
BRAKE

FOCUS
PLAY
MICES

FEED
GND
Head Base Motor

REW

FEED
FF
REW
KICK

GAIN
LASER
LAMP
BRAKE

MB 8B41H

MB 8840

IC2

DATA
PLAY
CLOCK
SYNCH
SSC.7
516
REMO
CON
REMO CON

Tracking
Output

Head   Main Motor

S-2003

JP1   GND   JP2   RED   JP3   JP4   JP5   main   JP6   JP7
HOLD4   big holder   LD9

OPEN
CLOSE
S1

PAUSE
S3

GREEN
LD3
RED

74LS138
IC1

7447
IC2

GREEN
D7

CLEAR
STOP
S4

GREEN
D2
big holder

PLAY
S2

RED
LD4

RED
LD10

INTRO SKIP
S11

S5   S6   S7   S12   S13
|◁ |◁   SET   ◁◁   ▷▷|

DUAL MEMORY
START S9   END S10

REPEAT
S8

2003   KEY INDICATOR (9)

10. OTHER PARTS

10-1. Front View

10-2. Top, Bottom & Mechanism Section

Fig.1 Top View

S-2000
S-2006
S-2013
S-2016
S-2003
Remote Control (Reciever)

Fig.2 Top View

S-2011
S-2012
Head Base
<Front Side>

Fig.3 Bottom View
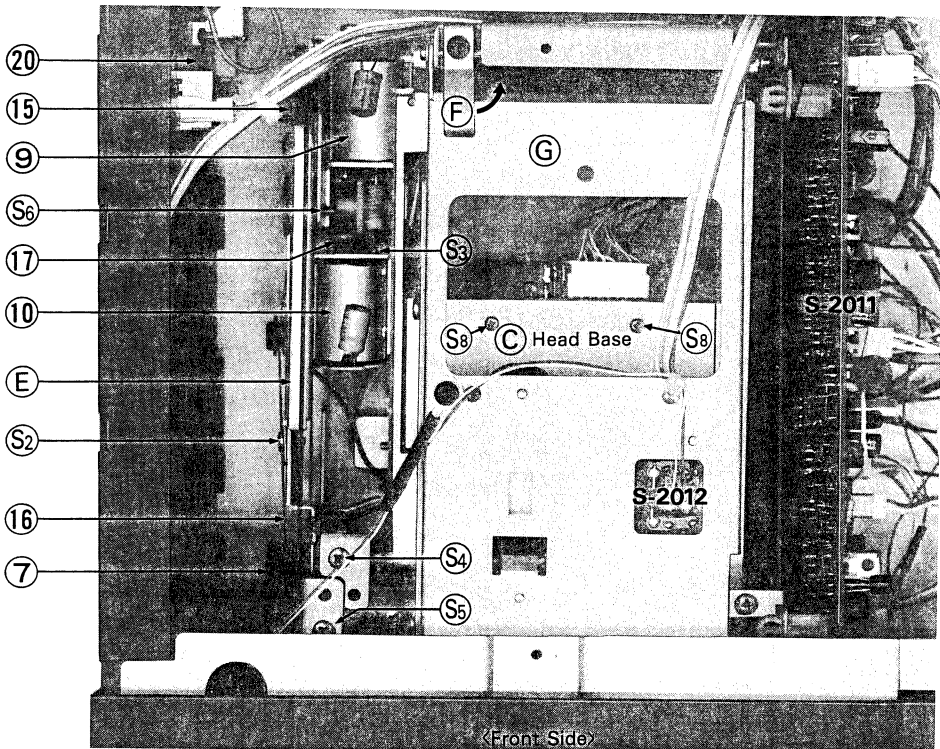

<Rear Side>
S-2010
Adjust Screw
<Front Side>

Fig. 4 Front View of Mechanism Assembly

Micro M
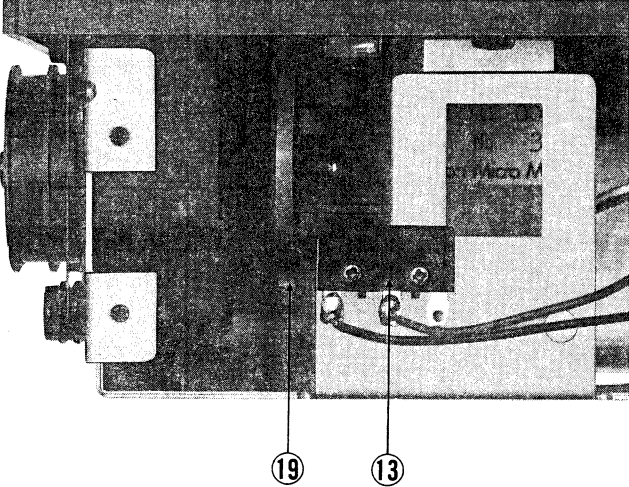
Fig. 5 Right Side View of Mechanism Assembly

Disc Table

Parts List <Front View>

Parts No.	Stock No.	Description
1	46706300	Phone Jack
2	13714710	Left Side Panel Ass'y
3	13703900	Knob, power SW.
4	13705300	Joint Shaft, power SW.
5	13707600	Front Panel Ass'y
5-1	13703600	Display Table
6	13708300	Dress Panel
7	13705000	Bonnet
8	46549500	Push SW., OPEN/CLOSE, PAUSE, PLAY, CLEAR/STOP, INTRO SKIP, REPEAT, DUAL MOEMORY, ▶≫ , ≪◀ , SET, ▶▷ı , ı◀◀
9	13714810	Right Side Panel Ass'y

Parts List <Top, Bottom & Mechanism Section>

Parts No.	Stock No.	Description
⚠ 1	38004700	Power Supply Cord <XX>
⚠	38004500	Power Supply Cord <EU>
⚠	38004300	Power Supply Cord <BS>
2	47157300	Cord Cover
⚠ 3	15013701	Power Transformer <XX>
⚠	15013705	Power Transformer <EU>
⚠ 4	46364900	AC Outlet <XX, CS>
5	13708100	Disc Table
6	13708700	Disc Table Roller (3)
7	47320900	Pulley, D28
8	13721200	Head, MLP-1A
9	46719600	Motor (F), for disc table
10	46722700	Motor (G), for head base
11	46719700	Main Motor, for disc
12	13720900	Micro Switch, head base position
13	13720900	Micro Switch, inside position of disc table
14	13719300	Micro Switch, out side position of disc table
15	13709900	Tension Ass'y
16	13721800	Disc Table Drive Cord (1.6m)
17	13714600	Belt, for disc base drive
18	18087200	Disc Sensor Switch Ass'y
19	13708500	Lift Cam
⚠ 20	07188600	2A 250V AC Fuse <XX, CS>
⚠	07188400	1A 250V AC Fuse <XX, CS>
⚠	07184400	500mA 250V AC Fuse <EU, BS>
⚠	07204700	Slide Switch <EU, BS>

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11. HOW TO REPLACE MAIN PARTS

A. Bonnet
1) Remove two bonnet fixing screws from the back side.

B. Bottom plate
1) Remove three bottom plate fixing screw. (two on the back side and one on the bottom side).

C. Backside Panel
1) Remove bonnet and bottom plate.
2) Remove right and left side plates.
3) Remove reinforcement frame Ⓐ disposed between back plate and backside panel. (See Fig. 1 on page 21.)

D. Front panel assembly
1) Remove bonnet and bottom plate.
2) Remove right and left side plates.
3) Remove reinforcement frame Ⓐ disposed between back plate and backside panel.
4) Remove power switch connecting rod Ⓑ and power switch board S-2004 (See Fig. 1 on page 21.)
5) Remove mechanism servo control board S-2011.
6) Remove display board S-2003.
7) Remove front panel assembly.
8) Remove remote-control optical sensor section (See Fig. 1 on page 21.)

E. Mechanism assembly
1) Remove front panel aseembly.
2) Remove four back plate and mechanism assembly fixing screws.

F. Main motor (for rotaing disc) ⑪
1) Remove bottom plate.
2) Remove the connector leading to main motor from servo control board S-2011.
3) Remove board S-2011 from two board holders and then cut off the lead connected to main motor.
4) Shift head base Ⓒ toward the backside of the set.
In this case, rotate pulley Ⓓ by the hand. After motor has been replaced, the head base will automatically be returned to the original position when power swtich is turned on. (See Fig. 3 on page 21.)
5) Remove three main motor fixing screws Ⓢ①. (See Fig. 3 on page 21.)
6) Shift motor toward the backside of the set and then pull it toward you.

Note: Make sure to perform Adjustment of Main Motor Revolution on page 24 after replacement.

G. Head base shifting motor ⑩
1) Remove bonnet and bottom plate.
2) Loosen reinforcement metal fixture fastening screw Ⓢ② and then shift the fixture Ⓔ upward. (See Fig. 2 on page 21.)
3) Remove motor belt ⑰. (See Fig. 2 on page 21.)
4) Remove two motor leads.
5) Remove two motor fixing screw Ⓢ③. (See Fig. 2 on page 21.)

H. Disc table shifting motor ⑨
1) Remove mechanism assembly.
2) Move FH plate depressing spring Ⓕ in the direction of arrow and then lift FH plate Ⓖ upward. (See Fig. 2 on page 21.)
3) Remove two disc plate fixing screws Ⓢ④ and Ⓢ⑤ and then remove disc plate Ⓢ. (See Fig. 1, 2 on page 21.)
4) Lift head base Ⓒ. (See Fig. 1, 2 on page 21.)
5) Shift reinforcement plate Ⓔ and then remove head shifting motor. (See Fig. 2 on page 21.)
6) Remove string holder.
7) Remove motor leads.
8) Remove two motor fixing screws Ⓢ⑥ and then remove motor. (See Fig. 2 on page 21.)

Driving string for disc table
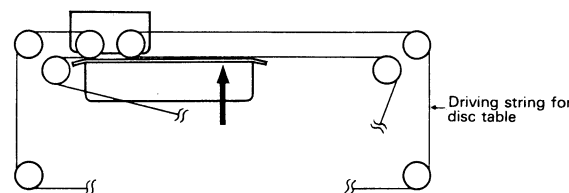
Note: When installing the reinforcement, be sure to position it in parallel with string as Fig. 2.

I. Head (LASER pick up) ⑧
1) Remove bonnet and bottom plate.
2) Pull out disc table.
3) Shift head base to the central position by rotating pulley Ⓓ of feed unit assembly Ⓗ by the hand. (See Fig. 3 on page 21.)
4) Remove three pick up fixing screws Ⓢ⑦ from the top surface of the set. (See Fig. 3 on page 21.)
5) Remove connector leading to head and three leads ①. (See Fig. 3 on page 21.)

Note: In removing these leads, use a soldering iron one terminal of which is grounded in order to prevent LASER diode from being damaged due to static electricity.

6) After having removed the leads, short red lead to black lead for prevention of damage due to static electricity.
7) In heads for service, the red lead is shorted to the back lead on head terminal connecting board. After the lead has been connected, remove this black lead.

Note: When head is replaced with a new one, make sure to perform all the adjustments for mechanism control section.

Note: Perform step 6) when mechanism servo control circuit board S-2011 is replaced with a new one.

12. ADJUSTMENTS

A. Check whether or not the mechanism assembly is defective, before adjusting the set.
1. When disc plate will not move; that is, LOADING does not operate, check the following points:
   a) Fixing screws or pins for transmit are removed.
   b) String is set to pulley correctly.
   c) Main frame does not stay at the uppermost position.
   d) Loading motor is rotating.
   e) When main frame rises up, microswitch for detecting disc-table IN-position is depressed.
   f) When disk plate comes out, microswitch for detecting disc-table OUT-position is depressed.
   g) Protection switch is not kept closed.
   h) Protection switch is out of contact with panel edge. (An appropriate clearance is 0.3 to 0.8 mm between switch top surface and panel edge.)
   i) Disc is correctly chucked. (Pressure of center cap against disc is 200 to 250g, which is determined by the pressure of FH depression spring.)
   j) Disc is correctly fitted.
2. When feed (head base) will not move:
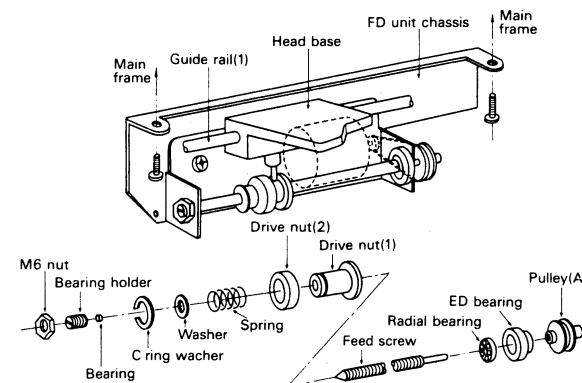
a) There exists no dust or foreign substances around feed screw and drive nut (1).
b) Rubber belt is set correctly.
c) When head holder is located at the initial position, microswitch is depressed.

B. Make sure to perform Adjustment of Mechanism Servo described on page 23, when mechanism servo board S-2011 is replaced with a new one, when optical head is replaced with a new one, or when it seems that mechanism servo system is not adjusted correctly.

C. Perform Adjustment of Mechanism Assembly when the following troubles occur. However, it is unnecessary to adjust Servo Board by the use of adjusting connector lead assemblies described on page 23 in every case.

• Examples of Trouble
a) Sound is reproduced jumpingly or repeatedly during PLAY operation.
b) Focus is not correct, so that disc table comes out.
c) Music selection operation is not normal.
d) The number of musics and the time are not indicated correctly beacause lead-in detection is abnormal.
   Or, music begins to be played beginning from the middle.

e) Creak sound is produced while oscillating.
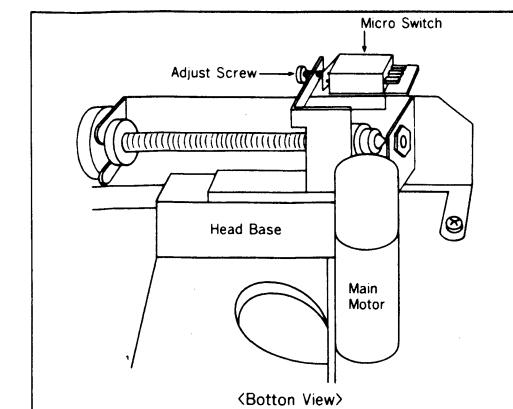In these cases, check and adjust the set as follows:
* Check the eye pattern of output signal waveform from servo system circuit. In case the eye pattern is not normal, this causes sound jamping, repeat or defective music selection. In case the eye pattern is not correct, finely adjust tracking gain variable resistor PVR05 and focus offset variable resistor PVR02. However, take care that an excessively high tracking gain causes oscillation.
(Refer to the drawing on page 23 with respect to to checked position and adjusted parts.)
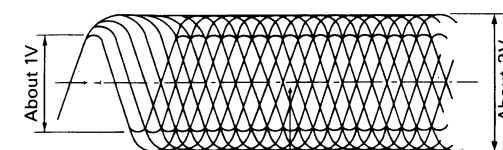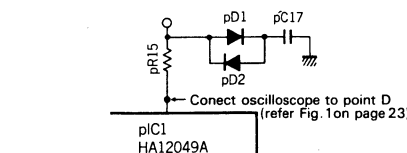
The best condition can be obtained when appropriate openings exist on both the upper and lower sides.

* In case sound jumping or repeat occurs, finely adjust bit PLL described under Procedure 3 on page 24, in addition to the above eye pattern adjustment.
* According to the trouble state, adjust servo board described on page 23. However, when the range to be adjusted is not great, perform step 10 in adjustment of mechanism section and succeeding procedure. In this case, it is unnecessary to disconnect connectors from board S-2011. Therefore, disregard the description of GAIN, LAMP, LASER, PLAY terminals explained under Adjusting Conditions.
* In case lead-in operation is abnormal, adjust it as follows:
Shift head base to the innermost position and then adjust adjusting screw so that microswitch is turned on.
After adjustment, check lead-in operation and that the number of musics and time can be displayed and further the first music can be played beginning from the start.
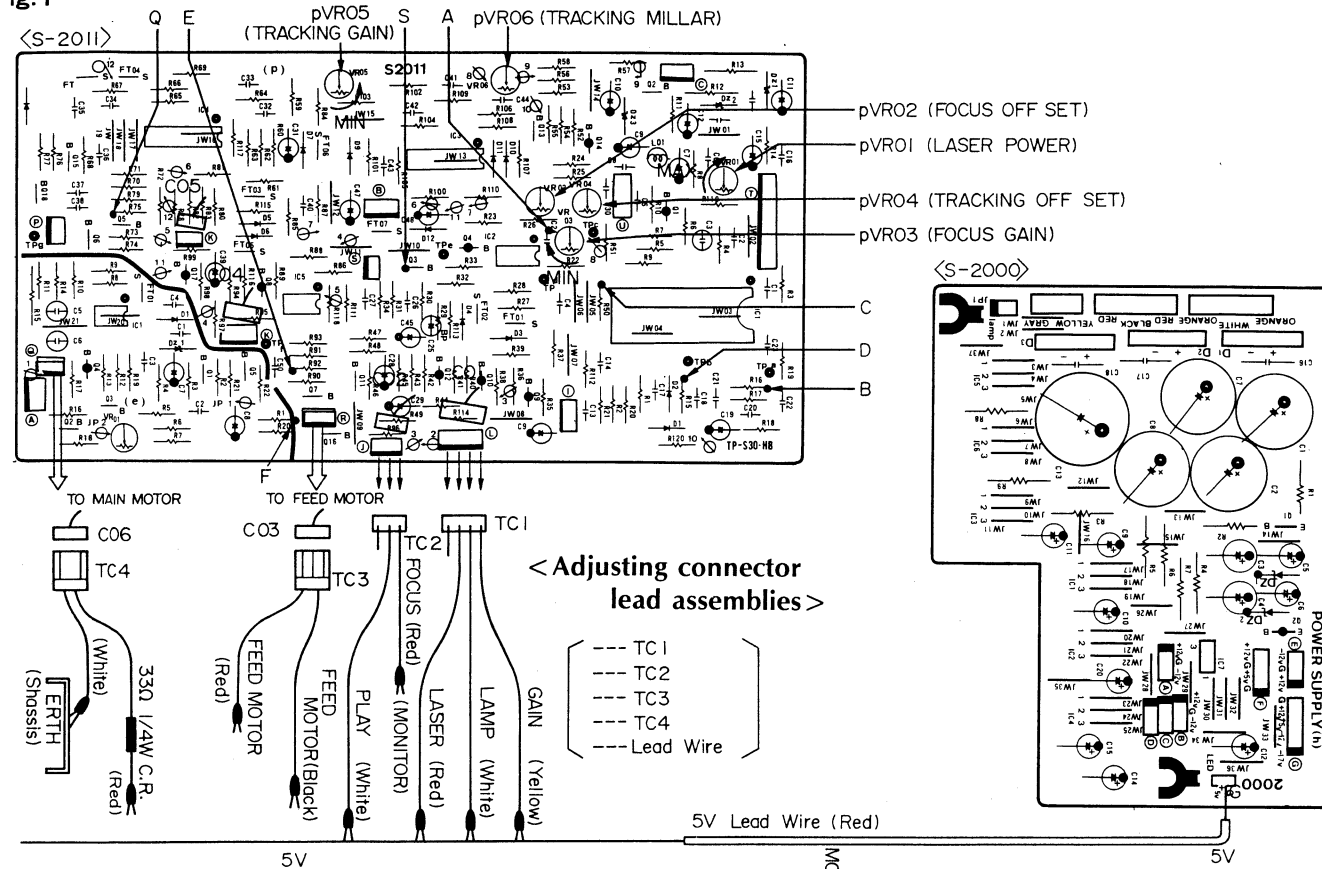
Note: Be sure to remove mechanism assembly before this adjustment. Further, make sure to perform this adjustment whenever microswitch for detecting head-base initial position has been replaced with a new one.
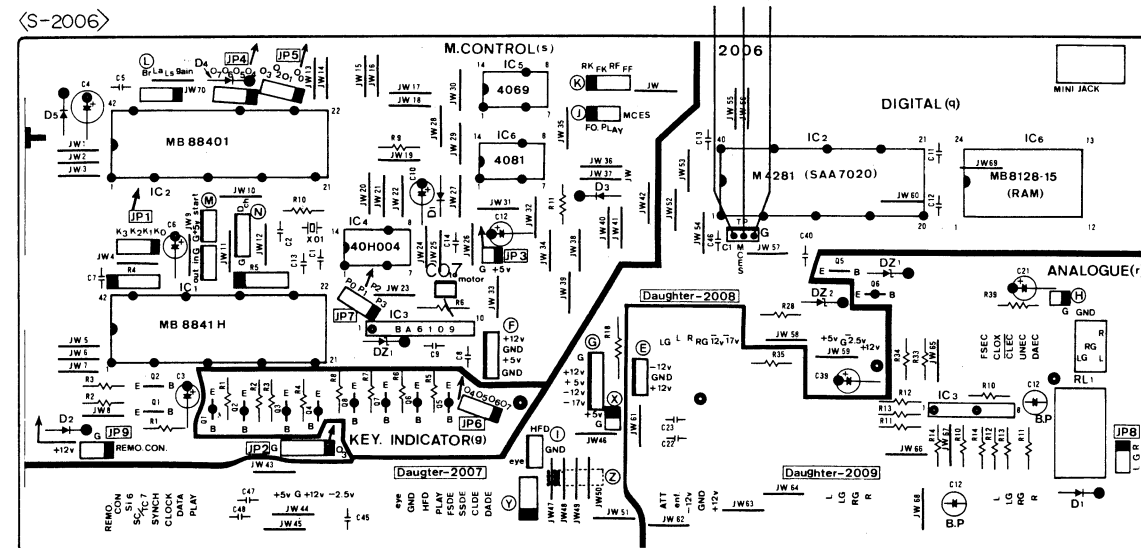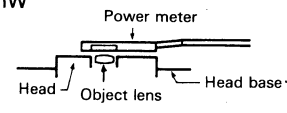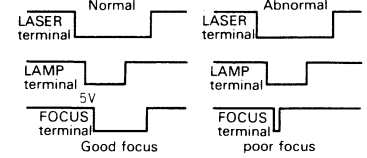
12-1. Adjustment of Head Servo Section

● Fig. 1

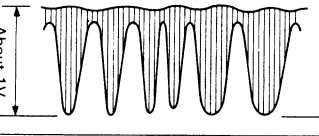〈S-2011〉

Q E pVRO5 (TRACKING GAIN) S A pVRO6 (TRACKING MILLAR)

pVRO2 (FOCUS OFF SET)
pVRO1 (LASER POWER)
pVRO4 (TRACKING OFF SET)
pVRO3 (FOCUS GAIN)

〈S-2000〉

C
D
B

TO MAIN MOTOR
C06
TC4
C03
TC3
TC2 TC1
F TO FEED MOTOR

ERTH (Chassis) (White)
33Ω 1/4W C.R. (Red)
FEED MOTOR (Red)
FEED MOTOR (Black)
PLAY (MONITOR) (White)
FOCUS (Red)
LASER (Red)
LAMP (White)
GAIN (Yellow)

〈Adjusting connector lead assemblies〉

[--- TC1
  --- TC2
  --- TC3
  --- TC4
  --- Lead Wire]

5V Lead Wire (Red)

5V   5V

● Fig. 2

〈S-2006〉

DIGITAL (q)
MINI JACK

MB 88401
4069
4081
IC2 M4281 (SAA7020)
MB8128-15 (RAM)

40H004
MB 8841 H

ANALOGUE(r)

KEY. INDICATOR(q)

Daughter-2008
Daughter-2007
Daughter-2009

● Preliminary procedure by the use of adjusting connector lead assemblies

1. Push the OPEN/CLOSE button to move out the disc table, then pull up the dress panel to remove it. Turn off the POWER switch.
2. Set each variable resistor on board S-2011 as follows: (See Fig. 1)
   PVRO1 ..... MAX,   PVRO3 ..... MIN,   PVRO5 ..... MIN,
   PVRO2, PVRO4, PVRO6 ..... CENTER
3. Remove connectors C01 to C06 on board S-2011.
4. Connect a lead to 5V power supply pattern lead on board S-2000.
5. Connect adjusting connector assemblies TC1 and TC2 to two pin assemblies from which the connectors C01 and C02 have been removed on board S-2011.
6. Connect adjusting connector assemblies TC3 and TC4 to two pin assemblies from which the connectors C03 and C04 have been removed on board S-2011.
7. Connect GAIN (yellow), LAMP (white) and LASER (red) leads of the adjusting connector assembly TC1 and PLAY (white) lead of the connector assembly TC2 to a 5V lead (red) connected to board S-2000 by use of each clip attached to the end of each connector assembly lead.

Note: Do not connect FOCUS (red) lead of connector assembly CT2 and other two leads of connector assemblies TC3 and TC4. Connected positions of these leads will be instructed under ADJUSTMENT.

〈Adjustment of Mechanism Servo Section〉

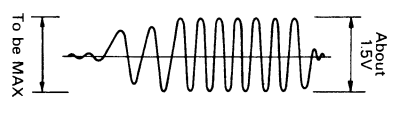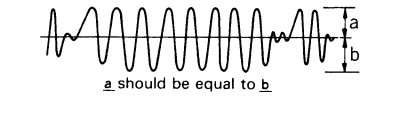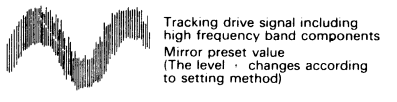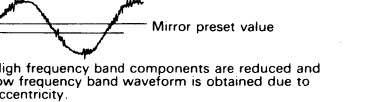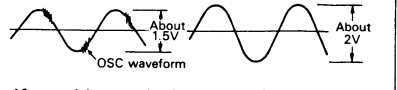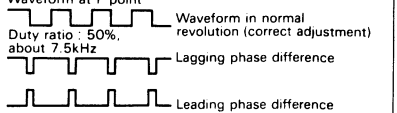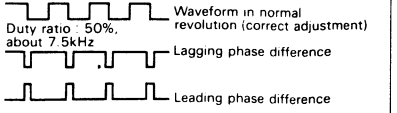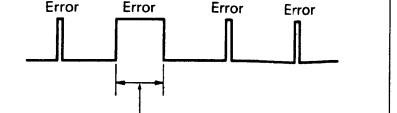|	Adjustment procedure	Checked Position	Adjusted Parts	Adjustment Contents	Adjusting Conditions
1	Adjustment of tracking mirror preset value	Between Q point and ground (Emitter of PQ5) DC voltmeter	PVR6	DC 0V ±0.3V	1. POWER ..... ON 2. Disc ..... none 3. GAIN, LASER LAMP, PLAY terminals ..... H (5V) 4. MAIN MOTOR ..... OFF
2	Adjustment of LASER power	Upper surface of head lens Power meter	PVR1	0.4mW Power meter	1. POWER ..... ON 2. Disc ..... none 3. LASER terminal ..... from H(5V) to L(ground) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. MAIN MOTOR ..... OFF
3	Adjustment of focus offset	Between A point and ground (output of PIC1) DC voltmeter	PRV2	DC 0V	1. POWER ..... ON 2. Disc ..... none 2. GAIN, LASER, LAMP, PLAY terminals ..... H(5V) 3. LASER terminals ..... L (chassis) 4. GAIN, LAMP, PLAY terminal ..... H(5V) 5. MAIN MOTOR ..... OFF
4	Operation check of object lens	Between S point and ground (Emitter of PQ3) DC voltmeter		o Head object lens moves toward disc when LAMP terminal changes from H(5V) to L(chassis). o Potential is DC 0.7V at S point.	1. POWER ..... ON 2. Disc ..... none 3. LASER terminal ..... L(chassis) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. MAIN MOTOR ..... OFF
5	Adjustment of focus gain (Focusing head object lens)	FOCUS terminal (adjusting lead assembly) Oscilloscope	PRV3	1. Set a disc to retract disc table. 2. Immediately after disc table is retracted, remove connector C07 on board S-2006. (Leave this connector remove for the succeeding adjustments.) 3. Rotate PVR3 a litle. 4. Change LAMP terminal from H(5V) to L(chassis). 5. Focus terminal of connector C02 is held at L(0V). 6. In case the terminal is not held at L(0V), rotate PVR3 and repeat the above procedures 4 and 5.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... OFF 4. LASER terminal ..... L(chassis) 5. GAIN, LAMP, PLAY terminals ..... H(5V)
6	Adjustment of tracking mirror preset value	B point (pin 28 of PIC1) Oscilloscope	PVR6	About 1V / To be MAX	1. POWER ..... ON 2. Disc ..... set 3. MIAN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. LASER terminal ..... L(chassis)
7	Adjustment of diffraction grating (for detecting tracking error or 3-beam spot positioning)	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	Screw on head lower side (See Fig.3 on page 21)	To be MAX / About 1.5V o The waveform amplitude becomes maximum at two points (normal point and abnormal point) as shown in the righthand drawing. o Abnormality results from incorrect eye pattern. This cause can be found under Jitter adjustment under Procedure 10.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. LASER terminal ..... L(chassis)
8	Adjustment of tracking offset	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	PRV4	a should be equal to b	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5 to motor as shown in Fig. 1) 4. GAIN, LAMP, and PLAY terminals ..... H(5V) 5. LASER terminal ..... L(chassis)
9	Adjustment of tracking gain	Between Q point and ground (Emitter of PQ5) Oscilloscope	PVR5	o Adjust the gain at a level beyond which oscillation begins. (Amplitude is about 0.7V)	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER terminal ..... L(chassis) 6. PLAY terminal ..... L(chassis)

12-1 (continued)

	Adjustment procedure	Checked Position	Adjusted Parts	Adjustment Contents	Adjusting Conditions
10	Adjustment of mechanism section (Jitter adjustment)	Between D point and ground (pin 23 of PIC1) Oscilloscope	Eccentric cam in mechanism section	o Adjust eye pattern at the best condition. The best condition can be obtained when appropriate openings exist on both the upper and lower sides. Note: In case eye pattern will not be improved under this adjustment, return to Adjustment Procedure 7, because the two maximum waveform amplitudes are rever sely adjusted at the normal and abnormal points in adjusting diffracting grating.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER terminal ..... L(chassis) 6. PLAY terminal ..... L(chassis) 7. Move head base (feed) to the center of the disc in accordance with the following method: o Apply 5V to the connector C03 on board S-2011 as shown in Fig. 1. (Connect the adjusting connector lead assembly TC3 as depicted below.)
11	Adjustment of focus offset	Between D point and ground (pin 23 of PIC1) Oscilloscope	PVR2	o Adjust eye pattern at the best condition	The same as described under Procedure 10 above.
12	Fine adjustment of tracking mirror preset result	B point (pin 28 of PIC1) Oscilloscope. Between Q point and ground (Emitter of PQ5) DC voltmeter	PVR6	The best condition can be obtained when appropriate openings exist on both the upper and lower sides. o Check that voltage lies within ±0.3V at Q point.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER terminal ..... L(chassis) 6. PLAY terminal ..... H(5V) 7. Remember the current position of PVR5 and then set PVR5 to MIN. (Return to the current position after Procedure 14.)
13	Fine adjustment of diffraction grating	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	Screw on head lower side (See Fig.3 on page 21)		The same as described under Procedure 12 above.
14	Fine adjustment of tracking offset	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	PVR4	a should be equal to b	The same as described under Procedure 12 above.
15	Check of eye pattern when head is move to the inner and outer circumfrences of a disk.	Between D point and ground (pin 23 of PIC1) Oscilloscope DC voltmeter		o Check that eye pattern is in the best condition when head base (feed) is moved to the inner and outer circumferences. Refer to Procedure 10 with respect to the method of moving head base. o Check that voltage is L(0V) at Focus terminal while head base is being moved.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER and PLAY terminals ..... L(chassis) 6. Return PVR5 to the position remembered under Procedure 12.
16	Check of switching operation of tracking loop	Between Q point and ground (Emitter of PQ5) Oscilloscope		o Check that waveform is as shown below with GAIN terminal set to H(5V) or L(chassis).	The same as described under Procedure 15 above.
17	Check of feed output	Between E point and ground (Emitter of PQ7) Oscilloscope		o Check that waveform is as shown below with GAIN terminal set to H(5V) or L(chassis). o If tracking gain is excessive, oscillation begins when GAIN terminal is set to H.	The same as described under Procedure 15 above.
18	Adjustment of main motor revolution.	Between F point and ground (an intersection of ER20 and ER1) Oscilloscope	EVR1	o Adjust duty ratio to 50 percent as shown below.	1. Return connectors C01, C02, C03, C04 C05 and C06 on board S-2011 and C07 on board S-2006 to the original state before adjustment. 2. Operate the set in PLAY after MUSIC SELECT has been completed.
19	Check of performance 1. Check that no sound jump occurs by the use of a Philips TEST SAMPLE DISC (NR 4A 410-056-2). 2. Check that focus loop is not out of the normal condition.		PVR5 / PVR3	Fifteen musics must be reproduced. If not reproduced, adjust tracking gain finely. Perform start operation after loading open. Repeat this operation two or three times. In this case, music must be reproduced smoothly. If not smoothly, adjust focus gain finely.	The same as described under Procedure 18 above.

12-2. Adjustment of electric circuits other than Mechanism Servo Section

	Adjustment Procedure	Checked Position	Adjusted Parts	Adjustment Contents	Adjusting Conditions
1	Rough adjustment of bit PLL	Between G point and ground (Pin 22 of qIC1) Frequency counter See Parts Location F-2007 on Page 18	qL1 (S-2007) See Parts Location F-2007 on Page 18	4.3128MHz	1. Check that the connectors of board S-2011 are all connected correctly. 2. Disc ..... none 3. POWER ..... ON
2	Adjustment of main motor revolution	Between F point and ground (an intersection of eR20 and eR1) Oscilloscope	eVR1	Adjust duty ratio to 50 percent as shown below.	1. POWER ..... ON 2. Operate the set in PLAY after MUSIC SELECT has been completed.
3	Fine adjustment of bit PLL	Between TPC1 and ground (S-2006) (See Fig. 1) Oscilloscope	qL1 See Parts Location F-2007 on Page 18	Adjust error within 2ms. Adjust this portion within 2ms, where there is no signal cause of black spot. In case it is impossible to adjust it within 2ms, finely adjust pVR05 and pVR02 while watching eye pattern.	1. POWER ..... ON 2. Reproduce the fifteenth music on Philips TEST SAMPLE DISC (NR4A 410-056-2). 3. Set TIME/DIV to 1ms and TRIG MODE to NORMAL, VOLTS/DIV to AC, COUPLING to AC in oscilloscope.
4	Adjustment of level difference between L-CH and R-CH	OUTPUT terminal, Oscilloscope	qVR1 See Parts Location F-2008 on Page 18	Match the output level of L-CH to that of R-CH (about 2V). The variable range of pVR1 is within ±1dB Therefore, in case of no TEST DISC, set qVR1 at the center.	1. POWER ..... ON 2. Reproduce the first music on SONY TEST DISC (TYPE 3 YEDS7).

A	B	C	D	E	F	G	H

13. SCHEMATIC DIAGRAM   13-1. Servo Control Section

*Design and specifications subject to change without notice for improvement.
*La présention et les specifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
*Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

HEAD SERVO (p)

S-2011

※ S-2015   ※ ANALOGUE (r)

MLP-1A

HAI2049A

A115

MOTOR SERVO (e)

POWER SUPPLY (h)   S-2000

S-2002

S-2001

S-2002

S-2002

S-2014

SYMBOL OF FUNCTION
(e) MOTOR SERVO
(h) POWER SUPPLY
(p) HEAD SERVO
(r) ANALOGUE

SYMBOL
△ Ceramic
⊟ Mylar
⊡ Polystrene
To Tantalum Electrolytic
Low-Leak Electrolytic
(B.P) Bi-Polar Electrolytic
Non-Inflammable Resistor

RESISTORS
Are in ohms, 1/4 Watts, ±5% Tolerance
Unless Otherwise Noted. k:kΩ, M:MΩ

CAPACITORS
Are in μF, Unless Otherwise Noted. P:pF

Measuring instrument
Volt Meter
Oscilloscope

⚠ Is Safety Part.
Use only replacement parts recommended by the manufacturer.

Servo Line

— — — Main Motor   ———— Tracking

— · — · — Focus   — — — Fead Motor

———— Signal Line

2SA952 2SB744 2SA1048
2SC2001 2SD794 2SA1115
                2SC2458
                2SC2603

μPC7805   2SK163

                2SA1175
                2SC2785

        2SJ103 M5218L

MB84081BP   μPC1373H

TC4538BP

NJM78M12A   BA6109P

            NJM79L18A

HA12049A   MB84640BP
HD7447A   MB88401-254
M74LS32   MB8841-1225M
M74LS74   MSM2128-15RS
M74LS74   MSM4011RS
M74LS86P   NJM4558D
M74LS164   NJM4559D
M74LS175   SAA7000
M5324P   SAA7011
MB74L32   SAA7020
MB74LS86   SAA7030
MB74LS138   TC40H004P
MB74LS164M TC4011
MB74LS175   TC4040BP
MB3614M   TC4069VBP
MB8128-15   TC4081BP
MB84011BM   TC91432P
MB84069BM   TDA1540D
MB84069BP

05Z2.7Y   1N60P
05Z5.6Y   1S2473
05Z8.2Y   1OE2
05Z10Y   TLG-123A
05Z13Y   TLR123
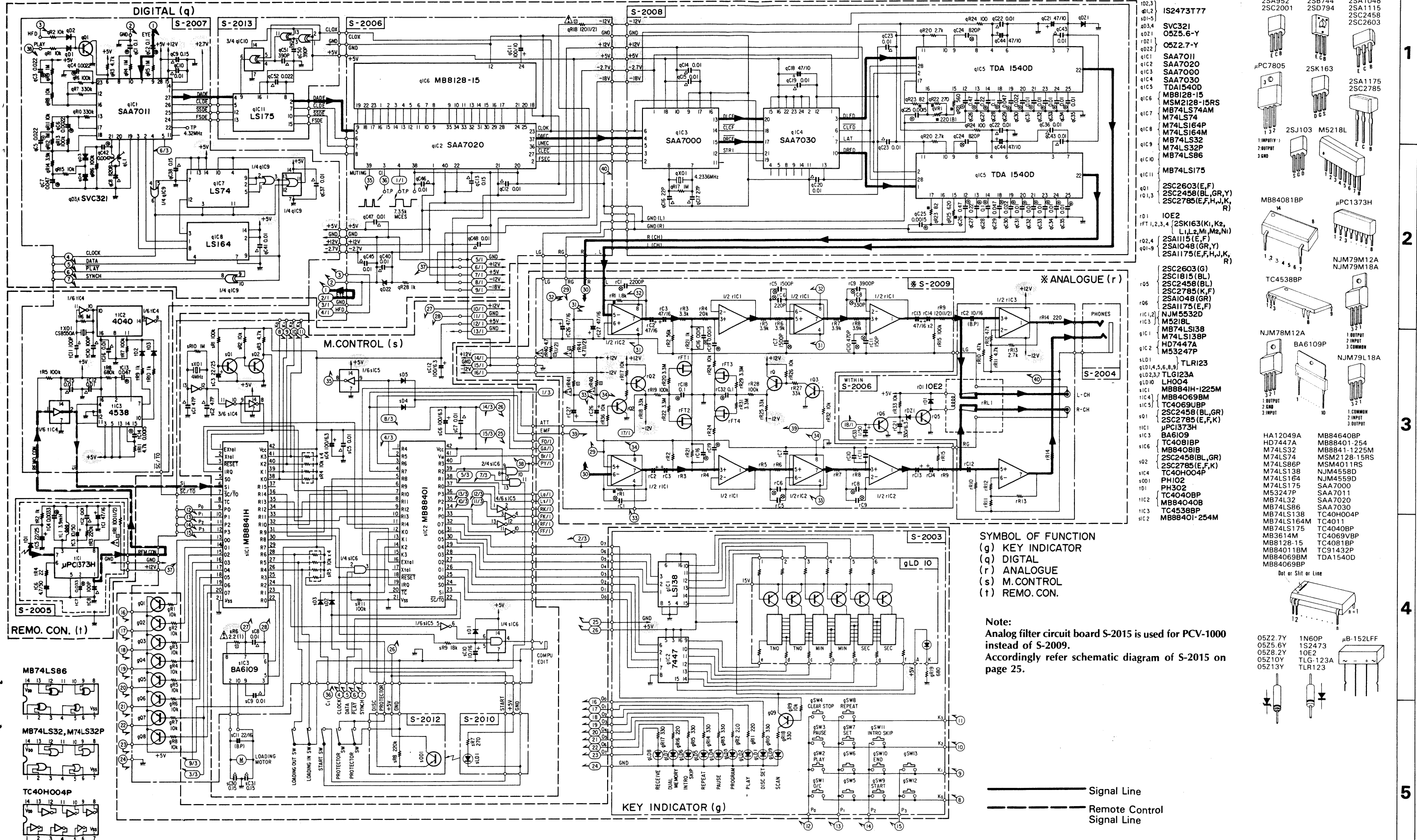
13-2. Amp. & Control Section

*Design and specifications subject to change without notice for improvement.
*La présentation et les spécifications sont susceptibles d'être modifiés sans préavis par suites d'améliorations éventuelles.
*Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

DIGITAL (q)

S-2007   S-2013   S-2006   S-2008

MB8128-15

SAA7020   SAA7000   SAA7030   TDA 1540D

TDA 1540D

ANALOGUE (r)

※ S-2009

PHONES

L-CH
R-CH

S-2004

M.CONTROL (s)

REMO. CON. (t)

KEY INDICATOR (g)

S-2005   S-2012   S-2010   S-2003

MB74LS86

MB74LS32, M74LS32P

TC40H004P

SYMBOL OF FUNCTION
(g) KEY INDICATOR
(q) DIGITAL
(r) ANALOGUE
(s) M.CONTROL
(t) REMO. CON.

Note:
Analog filter circuit board S-2015 is used for PCV-1000 instead of S-2009.
Accordingly refer schematic diagram of S-2015 on page 25.

Signal Line
Remote Control Signal Line

Parts list:
2SA952 2SB744 2SA1048
2SC2001 2SD794 2SA1115
           2SC2458
           2SC2603
μPC7805 2SK163
           2SA1175
           2SC2785
2SJ103 M5218L
MB84081BP μPC1373H
TC4538BP
NJM78M12A BA6109P
NJM79L18A

HA12049A   MB84640BP
HD7447A   MB88401-254
M74LS32   MB8841-1225M
M74LS74   MSM2128-15RS
M74LS86P   MSM4011RS
M74LS138   NJM4558D
M74LS164   NJM4559D
M74LS175   SAA7000
M53247P   SAA7011
MB74L32   SAA7020
MB74LS86   SAA7030
MB74LS138   TC40H004P
MB74LS164M TC4011
MB74LS175   TC4040BP
MB3614M   TC4069VBP
MB8128-15   TC4081BP
MB84011BP   TC91432P
MB84069BM   TDA1540D
MB84069BP

05Z2.7Y 1N60P μB-152LFF
05Z5.6Y 1S2473
05Z8.2Y 10E2
05Z10Y   TLG-123A
05Z13Y   TLR123

A	B	C	D

*Design and specifications subject to change without notice for improvement.
*La présention et les spécifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
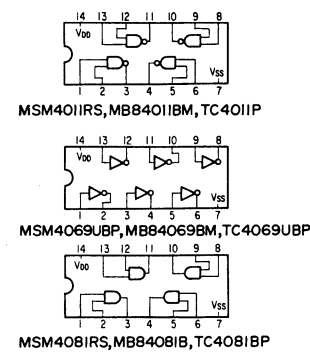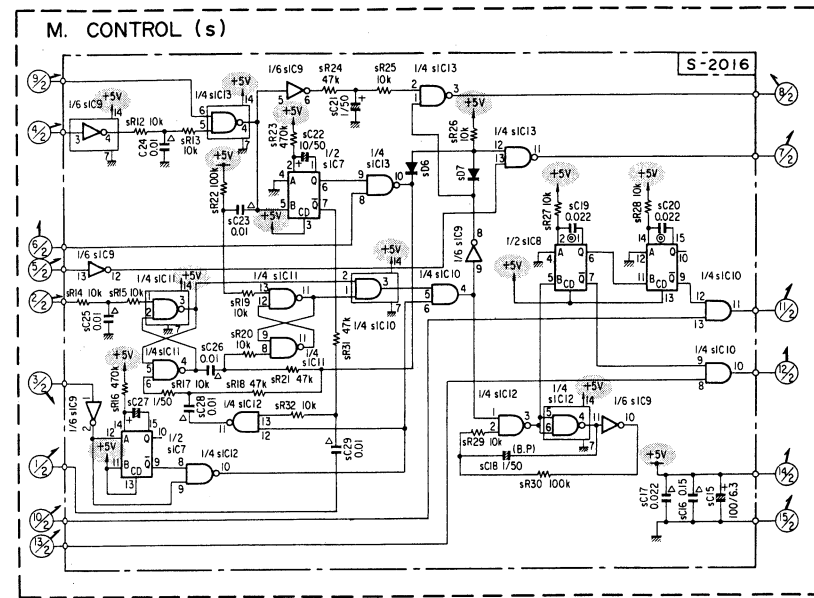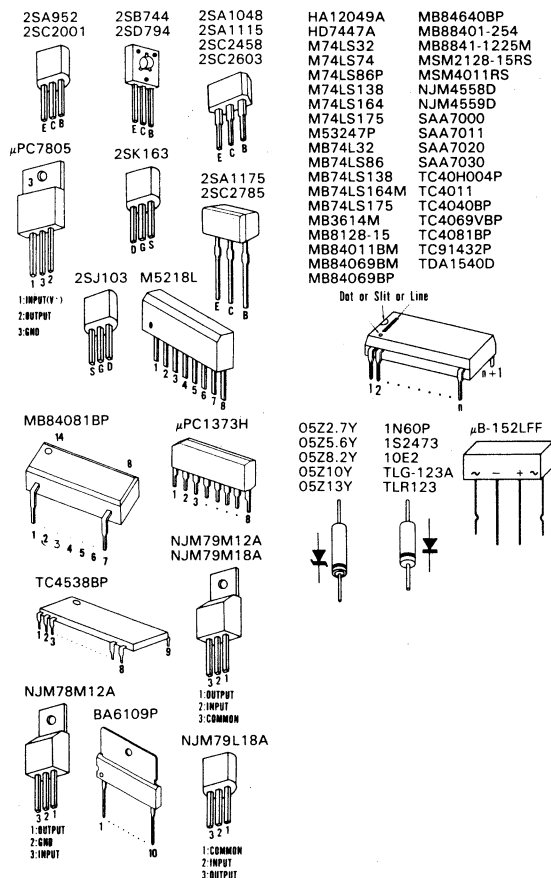*Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

13-3. Mechanism Control Section

M. CONTROL (s)

S-2016

s06,7 IS2473T77

MSM4011RS, MB84011BM, TC4011P

MSM4069UBP, MB84069BM, TC4069UBP

MSM4081RS, MB84081B, TC4081BP

SYMBOL
△ Ceramic
⊙ Mylar
To Tantalum Electrolytic
⊖ Low-Leak Electrolytic
(B.P) Bi-Polar Electrolytic
□ Non-Inflammable Resistor

RESISTORS
Are in ohms, 1/4 Watts, ± 5% Tolerance
Unless Otherwise Noted. k: kΩ, M: MΩ

CAPACITORS
Are in μF, Unless Otherwise Noted. P: pF

sIC7,8 TC4538BP
        MSM4538RS
sIC9   TC4069UBP, MSM4069RS
        MB84069BM
sIC10   TC4081BP, MSM4081RS
        MB84081B
sIC11,12,13 TC4011P, MSM4011RS
        MB84011BM

2SA952   2SB744   2SA1048   HA12049A   MB84640BP
2SC2001   2SD794   2SA1115   HD7447A   MB88401-254
                    2SC2458   M74LS32   MB8841-1225M
                    2SC2603   M74LS74   MSM2128-15RS
                               M74LS86P   MSM4011RS
μPC7805   2SK163   M74LS138   NJM4558D
                               M74LS164   NJM4559D
                    2SA1175   M74LS175   SAA7000
                    2SC2785   M53247P   SAA7011
                               MB74L32   SAA7020
2SJ103   M5218L   MB74LS86   SAA7030
                               MB74LS138   TC40H004P
                               MB74LS164M TC4011
                               MB74LS175   TC4040BP
                               MB3614M   TC4069VBP
                               MB812B-15   TC4081BP
                               MB84011BM   TC91432P
                               MB84069BM   TDA1540D
                               MB84069BP
                    Dot or Slit or Line

MB84081BP   μPC1373H   05Z2.7Y   1N60P   μB-152LFF
                         05Z5.6Y   1S2473
                         05Z8.2Y   10E2
                         05Z10Y   TLG-123A
                         05Z13Y   TLR123
             NJM79M12A
             NJM79M18A
TC4538BP
                                    1:OUTPUT
                                    2:INPUT
                                    3:COMMON
NJM78M12A
             BA6109P
                         NJM79L18A
1:OUTPUT   1:COMMON
2:GND   2:INPUT
3:INPUT   3:OUTPUT

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14. PACKING LIST

Parts No.	Stock No.	Description
1	91167620	Vinyl Bag
2	13707300	Styrofoam Packing
3	13707200	Carton Case
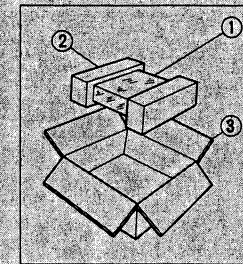
15. ACCESSORY LIST

Parts No.	Stock No.	Description
1	46722600	Pin Plug Cord
2	46607500	Operating Instruction
3	13716900	Transit Screw
4	13239400	Transit Spacer